OCT 3 1921

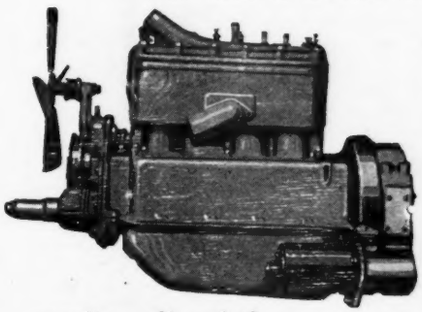
AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XLV
Number 13

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, SEPTEMBER 29, 1921

Thirty-five cents a copy
Three dollars a year

The Best Proof of the Four Cylinder Motor Is Its Place in the Truck Field



Trucks are now actually doing 15% of the total land haulage of the country. This is a splendid tribute to the four-cylinder engine, since fully 94% of all truck models are equipped with four-cylinder motors.

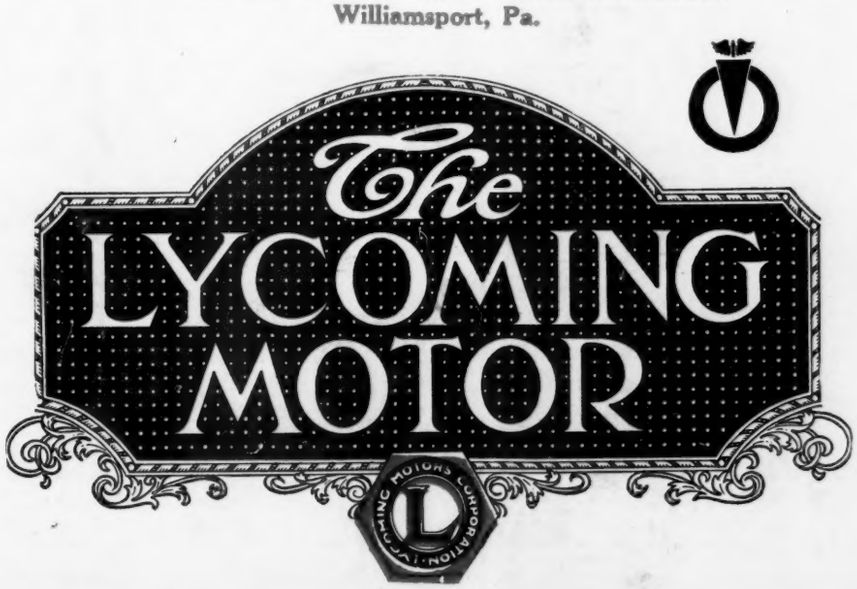
To be profitable, truck performance must be as nearly uninterrupted as possible; it must entail low maintenance and must be economical of gasoline, oil and tires.

The importance of the engine is paramount. It must be steady and powerful, simple of construction and well made to endure in truck service.

Particularly is this true in the speed-truck, where in addition to load, it must cover the ground quickly.

The Lycoming Motor has a well established place in the speed-truck field, because its sturdiness, its dependability and its ability to give consistent service under all reasonable conditions have made of it an equipment asset to both manufacturer and owner of a speed-truck. Write for booklet describing Model "KB" and giving specifications.

LYCOMING MOTORS CORPORATION
Williamsport, Pa.



Entered as second-class matter Jan. 2, 1903, at the post office at New York, N. Y., under the Act of March 3, 1879.

FEDERAL BEARINGS

UNIFORMITY

The Babbitt lining in every Federal Bearing shows the same tough, fine-grained, homogeneous structure because every Bearing is chilled immediately after it is lined.

SOLIDITY

Every Federal Bearing is guaranteed absolutely free from porosity, because the process of manufacturing makes it impossible for the Babbitt to contain air while cooling.

100% BOND

Unlike all other methods of manufacturing Bearings, the Babbitt lining and Bronze Back of every Federal Bearing is Bonded UNDER PRESSURE while the adhering alloy is at a constant temperature.

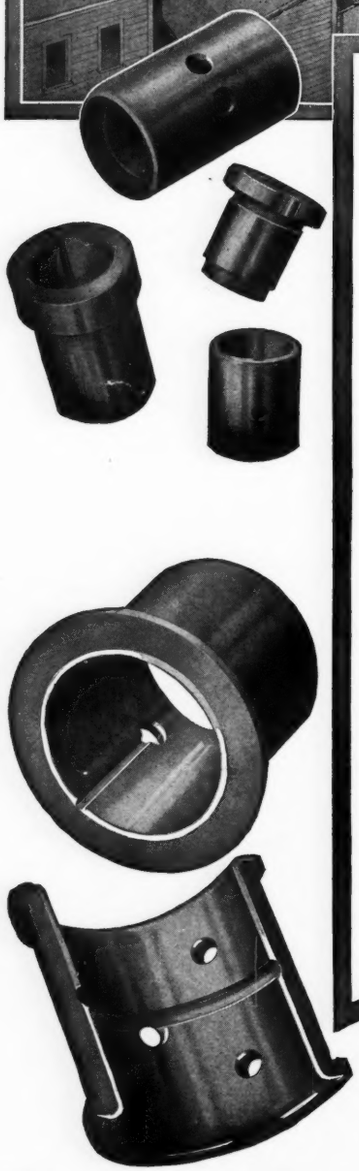
EXCELLENCE

Every Federal Bearing is manufactured from the highest grade materials, machined accurately and subjected to the most rigid inspection, because "FEDERAL, DETROIT" must be stamped on the back.

EVERY FEDERAL BEARING IS LINED BY

CENTRIFUGAL FORCE

(Process protected by patents)



FEDERAL BEARING & BUSHING CORPORATION

BABBITT-LINED BRONZE-BACK BEARINGS - BRONZE BUSHINGS - BRONZE CASTINGS

DETROIT — MICHIGAN

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLV. NEW YORK—THURSDAY, SEPTEMBER 29, 1921 No. 13

Getting the Best Out of the Dealer Organization

A loyal dealer organization is an important selling asset. Dealers' problems are especially acute now. The manufacturer who is constructively helpful at this time can build a sound basis for future sales

By Norman G. Shidle

THE necessity for more intensive selling effort has been met in various ways by different manufacturers. Some are making strong efforts to study their marketing problems in a scientific manner; to analyze sales possibilities in various territories. In many cases, a kind of economy in sales expense has been achieved by simply cutting off certain appropriations and activities. In others, however, it has been recognized that true economy lies rather in rendering sales effort more efficient so that the same results may be produced at less cost.

The whole problem of marketing and merchandising costs and methods is due for some very careful study. Friction anywhere along the merchandising line means just so much greater selling cost and just so much lost profit.

Of all the angles concerned in the problem, however, none is more difficult and important than that of dealer relationships.

Manufacturers have undoubtedly done a great deal for their dealers. Some, of course, have done more than others, but all have done something. During a period of selling difficulties like the present a closely knit, harmonious dealer organization is more necessary than at any other time. The life and success of the dealer and manufacturer are so strongly interdependent that both must pull in the same direction. But the primary object of the manufacturer, of course, is to sell more automobiles. He is developing good dealers when he is handling them in such a way as to enable them actually to sell a greater number of cars.

In the desire to mold a closely knit dealer organization, however, there is sometimes too strong a tendency toward centralization. There are certain phases of merchandising effort in which the manufacturer must necessarily take an active part, both for his own good and that of the dealer. The territorial analysis work being done by certain companies, for instance, is a necessary step in the development of sound merchandising policies and plans. The scope of such work, the fundamental factors involved and the extensive research necessary make it too difficult of performance for the average dealer. Sales helps and plans of various kinds devised and sent out by the manufacturer often give very valuable aid to dealers in making sales to the consumer.

But a point may be reached where the desire of the manufacturer to help becomes paternalistic or despotic. The average intelligence and capability of the dealer may be underestimated. Measures may sometimes be adopted for this reason or because of lack of confidence in dealer personnel that definitely tend to lower the dealer's efficiency, increase his dis-

content and create that friction which means greater selling costs.

Some dealers claim, for example, that manufacturers object to having the dealer build up his personal prestige in his territory; that the manufacturers insist that the dealer advertise only the car and that he refrain from institutional advertising designed to tie up the customer with the dealer himself. In certain cases, it is said, this objection has even reached the strength of a prohibition which left the dealer no alternative except to comply or give up the agency.

The objection to the dealer building his business on his personal reputation and ability, of course, comes largely from the fear of the manufacturer that the dealer, if successful in such a plan, would hold the whip hand over the manufacturer so far as the given territory is concerned. The dealer might so build up his personal prestige that he could dictate to the manufacturer in certain instances, because he could switch to another make of car and carry his customers with him. This has been done in the past, and it is doubtless the cause for the fear in some cases that it will be done again.

This is just one sample of the tendency sometimes manifested toward a dictatorial attitude in an attempt to develop a highly centralized dealer organization. The whole discussion concerning the justice or injustice of certain clauses in the usual dealer contract reveals numerous other similar difficulties.

The perfect dealer organization is not that in which the dealer is so tied up that he must do just as he is told in every case. Such dealers do not sell a maximum number of cars. It must be recognized in this matter, as in any other involving organization of human beings, that as individual responsibility is decreased, the necessity for supervision is increased. As the incentive for individual effort is removed, the permanent efficiency of the individual and, consequently, the organization is lessened.

No man can function at maximum efficiency unless he has a constant opportunity for growth and development. He must be enthusiastic and loyal. It must be admitted that a dealer who builds for himself and his business a place of high esteem in his community and who is personally popular and respected will sell more cars than the one who is a nonentity in his community. Suppose that such a dealer is thoroughly sold on the car which he is handling; that he has entire confidence in the company which manufactures it; that he has always had a square deal from his manufacturer in every way. This dealer is the greatest asset a company can have. But such a dealer is not developed by submerging his own business personality entirely in that of the car.

He is worth infinitely more to the manufacturer than ten dealers who are dissatisfied because they do not like dictatorial policies; who stay with the manufacturer because they are involved too heavily financially to be able to make a change, and who feel that they are making money in spite of the treatment accorded to them by the factory.

But all dealers are not like the excellent one pictured. Taken as a class dealers are just about the same sort of human beings as manufacturers. Some are worthy, dependable and trustworthy. Others are not. It is against the latter class that the manufacturer often feels it necessary to protect himself. But in so doing he may develop his organization along lines that do not make for ultimate efficiency.

One large manufacturer said recently, "If I could go all over the country and have my pick of any dealers that I wanted and could choose for my own organization any 10 per cent from all the dealers I could select men whom I could trust implicitly, never have any trouble in regard to contracts and give them every leeway with perfect confidence. I wouldn't care whether I had any contract or not.

"On the other hand, if the dealer had a similar free choice, he could readily select a group of 10 per cent of the manufacturers in whom he would have similar confidence."

The real task of the manufacturer is to enlarge the percentage of this trustworthy class of dealers, rather than to attempt to entirely control and dominate those in whom he has little confidence and those who have little confidence in him. To do this is no easy task. It requires sincere effort and an attempt to see the other man's point of view all along the line.

THE best dealer is the man who sells the most cars. Such a man can be helped to grow in the right direction, but will react unfavorably to driving. The man who doesn't mind being dominated is not the most efficient dealer or salesman. Quantity of sales is likely to vary directly with the loyalty and efficiency of the dealer organization.

There is much talk of the necessity of educating the dealer. Considerable progress along this line has been made by many manufacturers. Education, however, consists in aiding the dealer to develop himself, to develop his own capabilities, his own business and his own responsibilities. If a dealer has been honestly treated in all his relations with the manufacturer and feels himself to be an integral part of the organization whose cars he is selling, he is not nearly so likely to turn his back on that manufacturer should the opportunity to do so arise, as is the dealer who has retained an agency simply because of necessity.

The best dealer—for himself and the manufacturer—is the one who is self-confident, prominent and respected in his community and a real sound business man. Such dealers cannot be obtained and held by a factory which adopts dictatorial policies, attempts to get the better of its dealers in contracts, attempts to shift burdens of depression entirely on to the dealers and which delivers cars in an unsatisfactory condition.

The much discussed dealer contract is a matter for pyschological rather than legal settlement ultimately. The perfect dealer contract—entirely satisfactory to manufacturer and dealer—can never be written. The spirit behind the contract in both cases will always be the determining factor in making for satisfaction or dissatisfaction.

A prominent lawyer who has as clients a number of large automobile dealers and distributers said the other day that the matter of the dealer contract could never be settled by both the manufacturer and dealer trying to write into it protective clauses. To approach the question from that angle he considers is hopeless. In his estimation the only way out is through a better understanding between the two parties in each case, an honest attempt by both to see the other fellow's point of view and to give him a square deal in every way.

At the present time some companies are in a position

temporarily to dictate to their dealers. The dealer must either knuckle under or throw overboard a business and an investment which means his bread and butter. Business will return to normal. The handling of the dealer situation just now should be especially directed with an eye to the future.

The manufacturer who does his best for his dealers during a time of depression will be in an exceptionally strong position when business again starts up. The manufacturer has an obligation to fulfill. He cannot afford in any case to expect the dealer to bear more than his fair share of the burden of industrial depression.

One manufacturer, for instance, has tied his dealers to him very strongly by his actions before the depression set in. This manufacturer saw the dark cloud coming. He warned his dealers of it; kept them from overstocking, reduced his production and took his loss in the beginning. When good times come again this manufacturer's dealer organization can be expected to show a loyalty and an enthusiasm for the particular car that will be unusual.

There is an old saying that he who gives most gets most. Until this is generally accepted, business difficulties will continue to arise and become complicated, human relationships in business will continue to generate friction and inefficiency and relations between dealers and manufacturers will not be satisfactory. It is the spirit behind the dealer contract that counts.

Neon Filled Tubes for Ignition Circuit Tests

NEON, one of the gases which exist in extremely small proportions in the earth's atmosphere, has, as compared to air, a very slight resistance to the passage of electric current. The passage of a current through the gas causes it, under certain conditions, to emit an orange-red light, the intensity of which varies with the difference in potential, causing the discharge of current through it. This property is made use of in a special instrument designed for use in testing ignition systems.

The body of the gage is formed by a hard rubber tube closed at one end and sealed at the other by a brass cap. A small sealed glass tube containing the neon gas under a pressure considerably less than atmosphere is positioned within the rubber tube between two plugs of fine steel wool which fill each end of the outer tube and give it considerable electrical capacity. The glass tube is coated over the greater part of its external surface with silver, but a band about 3/16 in. wide and a spot opposite the window in the rubber tube is left uncoated. The silver coating remains in contact with the steel wool at each end, but the uncoated band forms a gap in the electrical circuit between the two ends of both tubes.

The gage functions in the following manner: When the metal cap is placed in contact with or close to a conductor, such as the terminal of a spark plug, which is receiving an electrical charge, the end of the gage adjacent to the conductor is also charged since the gage forms a portion of the capacity of the circuit, and this induces a charge of opposite polarity in the opposite end of the gage. The steel wool and the metal coating on the glass tube then become condensers (of relatively small capacity). In assuming this charge a current is induced in the neon gas column, the positive ions of the gas flowing toward the negative pole of the tube and the negative ions toward the positive pole. This flow of current causes the gas to glow, the intensity of the glow increasing as the potential increases.

When placed in contact with a spark plug terminal there is a flash of light each time the plug fires. The narrower the gap the lower the potential required to jump it and the duller the glow, and vice versa. If the electrodes of the plug are too close or the gap between them partly filled with carbon, the glow is dim. If the gap is too wide the flash is extremely brilliant, while for a correctly set and properly functioning plug the flashes are of intermediate brilliance. If the plug is shortcircuited the charge passes directly to ground, the tube is not charged, since no potential is built up, and no flash occurs. It is thus a simple matter to locate plugs which are missing or giving too weak a spark.

The Airco neon filled spark indicator

By passing the end of the tube along a high-tension wire, leaks are easily located, for the tube will glow brightly at a point where the insulation leaks, whereas, it will not glow at all or only very dimly at other points.

Since the body of the indicator is of rubber it can be held in the hand without the charge passing to ground through the body of the observer. The Airco spark indicator is manufactured by the Air Reduction Co., a concern producing air products from the distillation of liquid air. In making the liquid air the temperatures attained are not sufficiently low to liquify the helium and neon content. These two gases, together with some nitrogen, are trapped off and later separated by other means.

STAINLESS steel is being extensively used for the inlet and exhaust valves of internal combustion engines of all kinds. It is also being used in at least one instance for piston pins, and for the bolts and nuts of exhaust pipes and mufflers. As usual, the best results are obtained by polishing the objects to a high degree.

Refinements in Control Characterize the New Hudson

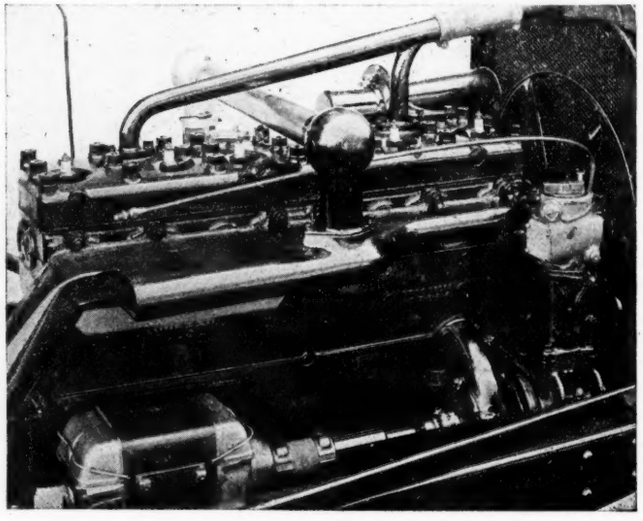
Clutch and brake controls and the steering gear have been redesigned to facilitate ease in handling. Carbureter air is pre-heated and the cast-in manifolding changed to afford better fuel vaporization.

By J. Edward Schipper

THE new Hudson Super Six model is now in production and being delivered to dealers. The principal changes are those intended to effect ease of control. In carrying out these changes, the front compartment has been redesigned and the details of the control mechanism have been so improved as to provide easier steering and easier pedal and control lever action. Changes have been made in the clutch and transmission, resulting in a lighter clutch pedal action as well as an easier gearshift. The brake linkage has also been altered to render the brakes more responsive.

There have been some changes which affect the external appearance of the car, particularly in the adoption of new fenders and front apron and some body fittings have been improved.

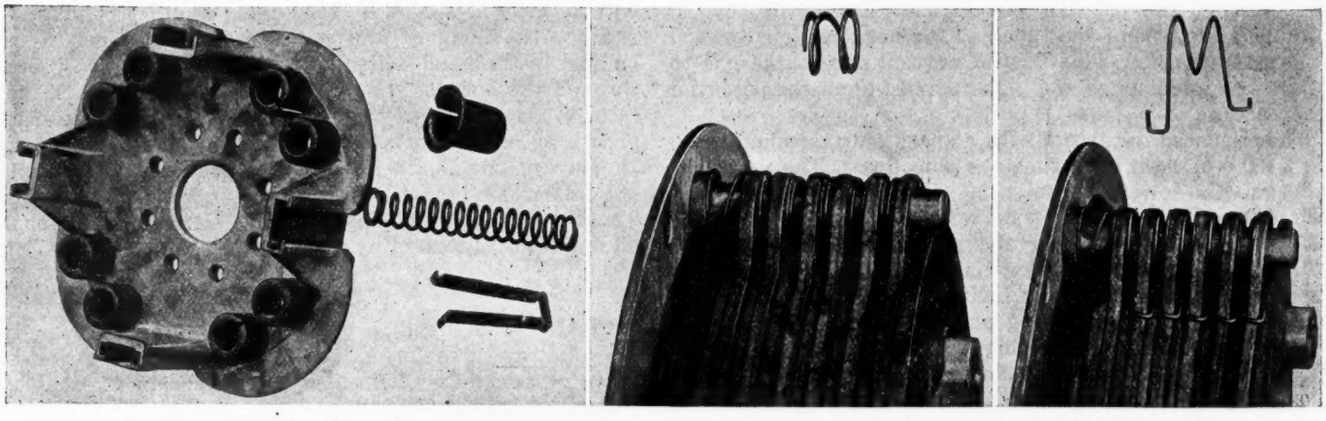
The engine, which has been in use since 1916, has been continued without any fundamental alterations. A change has, however, been effected in the air intake and manifolding. It has previously been Hudson practice to use cold air; on the new car, all of the air for the carbureter is pre-heated. Globe elbow joints are used to give a large sectional area to the piping at the turns and at the entrance to the carbureter. The air is heated in a stove which is integral with the exhaust manifold on the right side of the engine and is led over the top of the engine to the carbureter, on the opposite side. The carbureter is attached to a vertical flange at about the center of the block. The air pressure at the carbureter inlet is balanced with that in the float chamber by a compensating tube which connects the float chamber with the air intake. This is said to conserve gasoline on quick throttle opening.



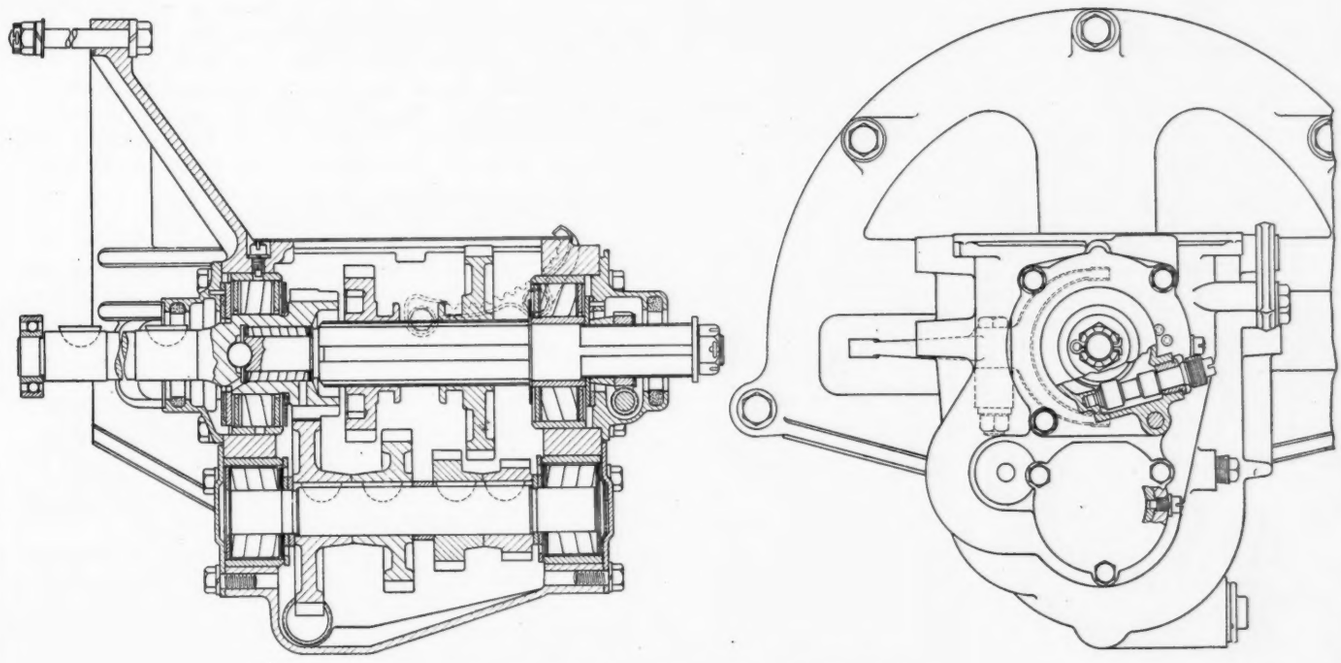
The Hudson engine, showing new air heating and piping

Internally, the manifolding has also been so altered that a modified form of a hot-spot is provided between cylinders 1 and 2 and 5 and 6. The intake manifold at these two points is brought into close proximity with the exhaust. Liquid fuel which collects in the pocket aids materially in shortening the warming-up period.

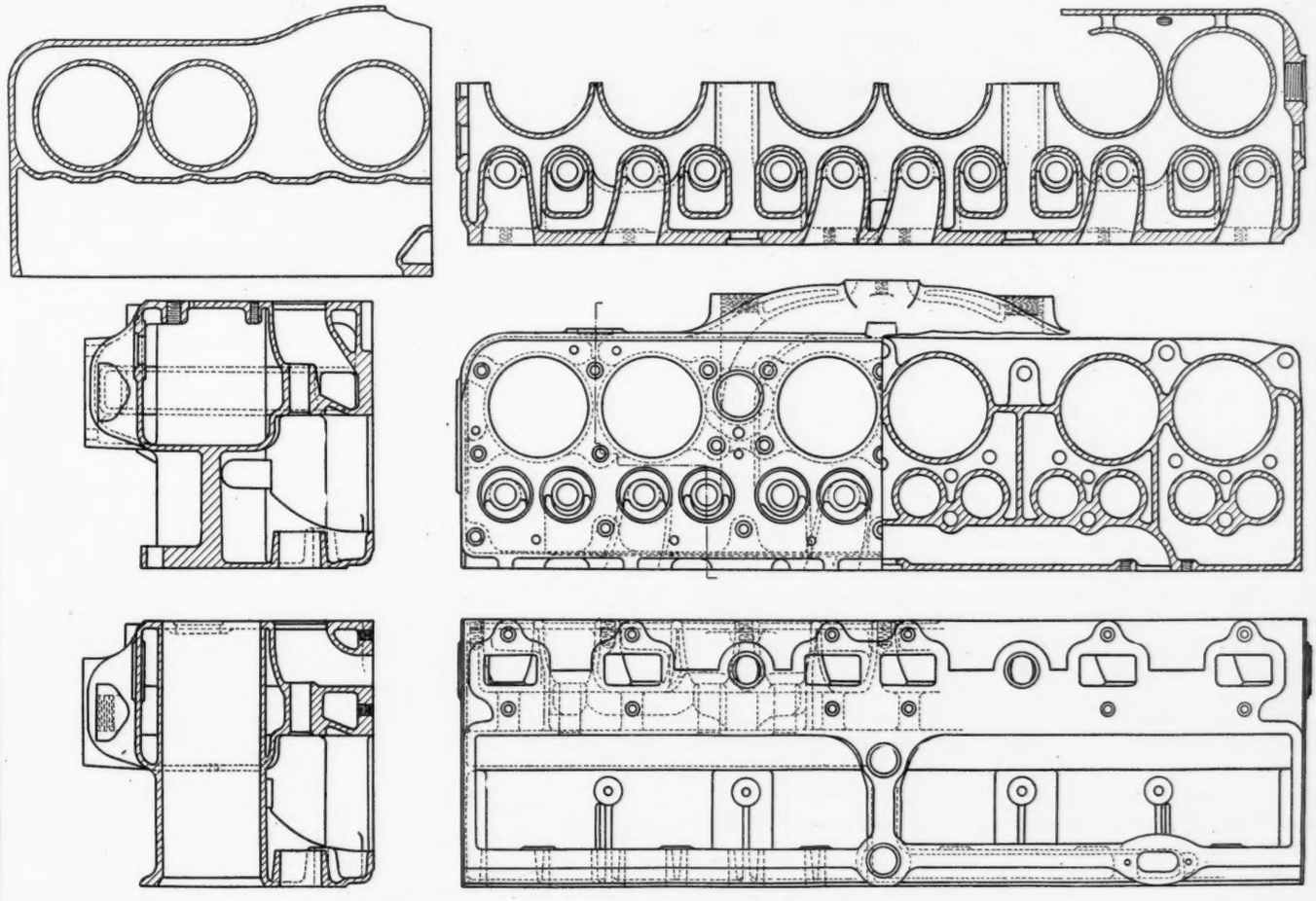
While the clutch employed in the new Hudson is fundamentally the same as that in older models, lighter-driven parts are employed to facilitate gear shifting. In the new construction, the transmission shaft is continued forward and forms the clutch shaft, eliminating the three-jaw slip joint used formerly as a connection between the clutch and transmission shafts. This shaft



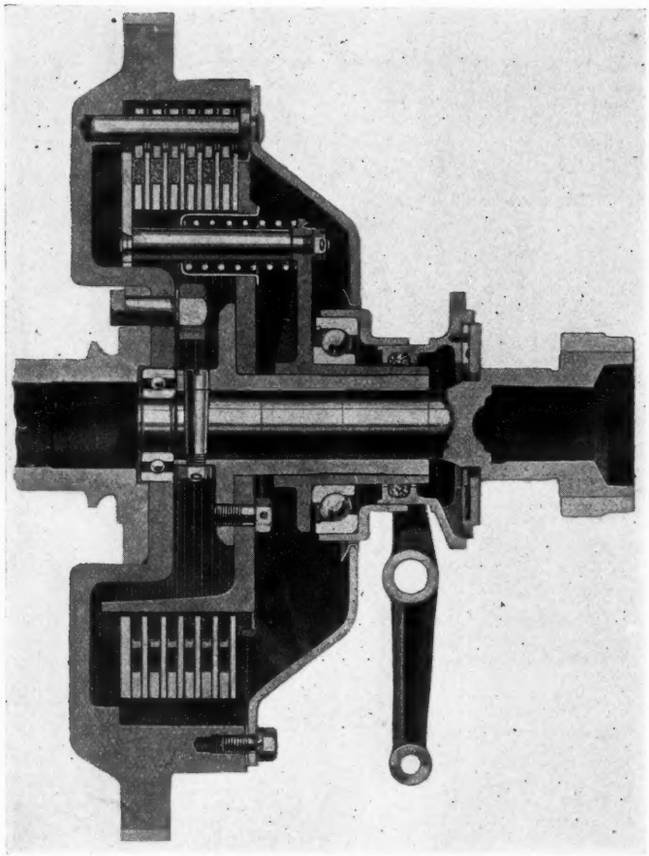
Left—Die-cast clutch spider with pressed metal spring cups and steel insert forming bearing surface for driven plate lugs. Center—Springs used to separate plates on disengagement. Right—springs used to prevent rattle when clutch is disengaged.



Sectional and end views of Hudson transmission



Views of new cylinder block, showing changes in cast-in manifold



The new Hudson clutch assembled

has a pilot bearing in the flywheel and carries the driven disks on a die cast aluminum drum. These driven disks are light, thin disks and do not carry the cork inserts which are now in the driving disks. Formerly, the driven disks carried these cork inserts and were the heavier of the two sets. This drum also carries cup-shaped inserts which act as the clutch spring retainers. There are eight clutch springs spaced equally about the aluminum drum, giving a uniform pressure on the bearing surfaces of the disks. The clutch release spider depresses these clutch springs during disengagement. A more positive separation of the clutch plates is insured by small springs placed between the clutch disks. The use of these springs prevents any tilting of the disks. There are also anti-rattle springs placed between the disks so as to prevent noise when the clutch is disengaged.

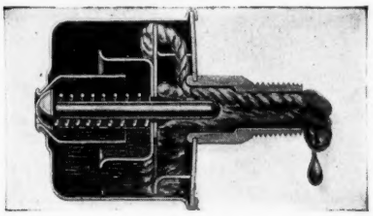
The clutch thrust bearing grease cup used in previous models has been eliminated. A large annular ball throwout bearing, automatically lubricated by the oil in which the clutch runs, is now employed. The die-cast drum and the extensive use of stampings gives a balanced clutch which is manufactured at a reasonable cost and without an exceptional amount of machining work.

The new gearset is not materially different from the old. The shifter mechanism is now mounted in a subassembly with the top cover plate. The speedometer drive has been enclosed and is now incorporated with the gearbox. The gear shifter lever has been lengthened and the ball handle placed closer to the driver's hand than formerly.

Another change which affects the ease of operation of the car is in the emergency brake lever. In addition to greater leverage, the ratchet has now been made heavier and the ratchet teeth larger. In order that this change does not affect the number of positions in which the brake lever may be placed, there are now two pawls employed which come into action alternately and give the effect of twice the number of teeth on the ratchet.

Ease of steering has been secured by changing the ratio of the steering gear from 7½ to 1 to 9½ to 1. This also results in a heavier worm wheel with consequent longer life. The drag link is now a one-piece tube instead of being welded in the usual way. The accelerator pedal is now placed to the right of the brake pedal and is designed to prevent a cramped foot position.

The lubricating points on the chassis are taken care of by a new type of oiler which does away with the old-



Wick feed oiler used in new Hudson model

fashioned grease cups. The oiler contains a reservoir and a wick feed. A new pump type of oil can is provided with the car to fill the oil reservoirs.

In exterior appearance the Hudson is changed but little. Deep crown fenders which, because of the increased depth of flange are more efficient as mud guards, have replaced the previous type. The front fenders now have aprons which extend to the extreme front end of the spring hangers. A splash apron placed between the spring horns improves the appearance of the car and affords further protection.

The wheelbase of the car remains the same, as do all of the major specifications. The tire size is unchanged but the tires now provided are cord in place of fabric. In the detail work of the body, there have been a few changes, although the body lines remain the same. The door jambs are now of pressed steel in place of wood and, consequently, more durable and solid. There is also an improved type of side curtain provided giving better weather protection. The windshield is now fitted with a metal strip with a rubber interlining between the two glasses. The price of the car remains unchanged.

Germans to Hold a Grand Prize Regularity Race

A GRAND Prize regularity and speed contest is to be held in Germany this fall under the auspices of a committee of which C. O. Fritsch is chairman. Only stock cars manufactured in Germany or Austria are eligible for entry, and these must have piston displacements corresponding to the German tax horsepower ratings of 6 and 8 (95.6 and 127.5 cu. in.). Cars of each rating will run in a separate class, and there will be subdivisions according to whether the engine has the valves in side pockets (standing valves, as they are called in Germany) or valves in the head (hanging valves). The minimum weight for the 8 hp. cars without fuel and tools is 1760 lbs. and the minimum weight for the 6 hp. cars 1430 lbs. The minimum tire sizes are 33 x 4.8 in. and 33 x 4.2 in. respectively.

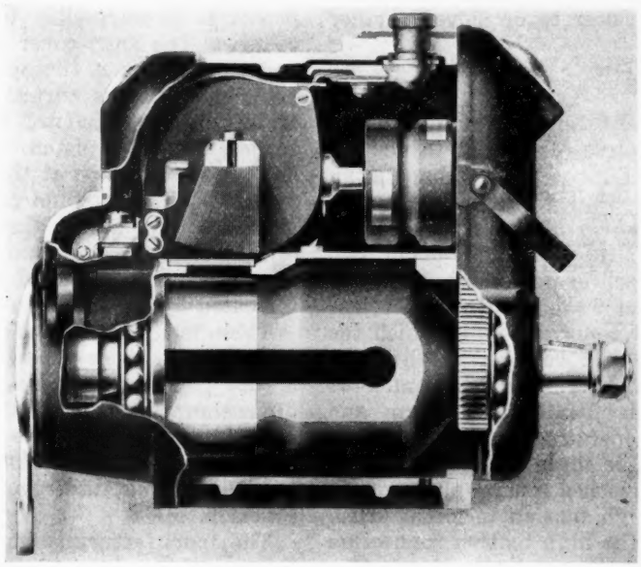
Only manufacturers and dealers can enter cars, and no more than three cars of any one make can be entered. Bodies for the competing vehicles must be built in accordance with designs furnished by the race management. Grand Prize will be awarded to the contestant whose circuit times show the least variation. There will also be speed prizes in each class. Minimum speeds of 46.7 and 40.4 m.p.h. are required in the two classes.

A New Swiss Magneto of the Inductor Type

Newcomer in American market incorporates many ingenious ideas. Rotor is a bell-shaped magnet forged integral with driving shaft. Both windings are stationary, hence no collector ring is required. One feature is accessibility of interrupter which is found by lifting a cover.

AN interesting design of magneto of Swiss manufacture, the Scintilla, has recently been introduced on the American market. It is of the inductor type, without movable windings, and while it comprises the same parts as any other magneto, considerable ingenuity has been displayed in the arrangement of details, whereby a number of advantages in manufacture, care and maintenance are secured.

The rotating part, or rotor, as it is usually called in electrical parlance, is a bell-shaped permanent magnet which has the driving end shaft forged integral with it. The pole pieces of this magnet are laminated, the laminations being slipped over extensions of the forging and held in position by two screws on each leg of the magnet, which screws also hold in place a bronze ring over the ends of the poles with which the shaft at the interrupter end is formed integral. The rotor is supported in ball bearings at both ends.



Cut-away view of Scintilla magneto

The magnetic circuit is completed by two laminated pole shoes set into the die-cast aluminum alloy housing and a laminated core extending through the stationary coils. The core is of substantially square section with rounded corners; its ends are slotted and it is fastened to the pole shoes by a machine screw at each end, passing through the slot and into the pole shoe. Both the primary and secondary coils are wound on this core, and the condenser is also incorporated in this unit. As both windings are stationary there is no need for a collector ring with its attendant difficulties. One primary lead is grounded to the core and the other is brought out to a strip brass connector which extends half way around the coil. At the top this connector makes contact with the low tension terminal from which connection is made to the ignition switch, by means of which the primary winding of the magneto can be short-circuited and the operation of the machine stopped. At the interrupter end there is a similar connection to the insulated block of the interrupter. This is a sliding contact, the interrupter block moving relative to the connector when the timing of the spark is changed. One part of each of these two connections is spring supported, so that a good, firm contact is obtained under all conditions.

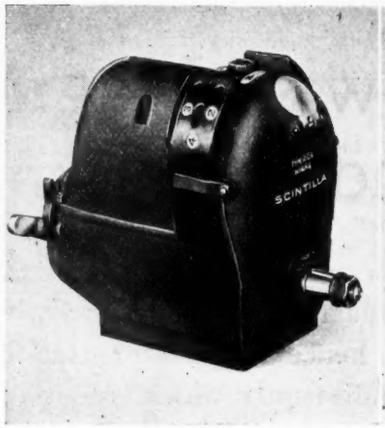
One of the most interesting mechanisms of the magneto is the interrupter. This consists of a cylindrical frame which fits into a corresponding seat in the housing and is locked in place by means of a bayonet lock. The timing lever is formed integral with a cap over the interrupter, this cap being held in place by means of a centrally located machine screw and a pair of dowel pins. There are eight equally spaced holes in a circle in the interrupter frame, and the timer lever, therefore, can be placed in any of eight different angular positions, permitting of adapting the magneto with ease to different engines. There is a special locking ring on the interrupter, with a radial lever which, when it is desired to insert the interrupter in position on the magneto, must be turned relative to the frame, against the torsion of a spiral spring. When in the proper position the interrupter can be pushed into place in the direction of the rotor axis. The lever on the locking ring is then released and the ring is snapped back by the spring, locking the interrupter in place.

For a four or six cylinder magneto a two-lobed cam is mounted on the rotor shaft and co-acts with a bell crank-shaped interrupter lever fitted with fiber cam follower and a fiber bushing. The contacts of the interrupter are always located on top, where they can be easily inspected and are protected from oil accumulations. A feature which is found on few if any other magnetos is that the timer is under the influence of a coiled spring which tends to bring it back to the retarded or late ignition position, so that if the driver is careless in looking after his controls there is little danger of the engine racing due to advanced spark.

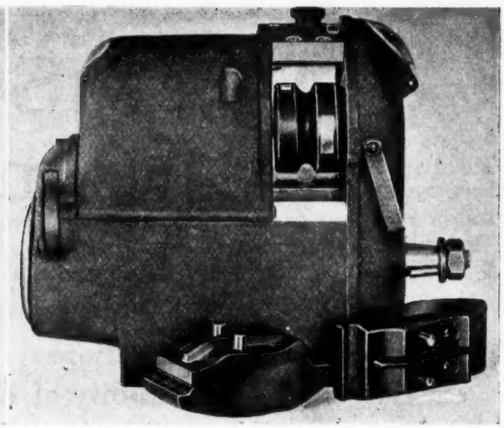
To get at the interrupter it is only necessary to remove a cover, known as the interrupter cover. This is clearly shown in one of the illustrations, which also shows the method of felt-packing the housing in order to make it waterproof. This cover can be removed by hand, being held in place by two spring catches, whereas the magneto cover, over the coils and distributer, is held in place by

two screws. A safety gap is provided on the secondary winding, one of the points of the gap being on the secondary terminal and the other on a brass strip laying on top of the rotor cover and grounded through the housing. A second safety gap is provided by the distributer, as in case of excessive secondary pressures, due to a disconnected cable or similar cause, the spark can jump from one of the distributer sectors to the rim of the distributer gear.

The distributer also is of quite original design. Contrary to conventional practice, it is located at the driving end. This is rendered possible by the fact that the high tension terminals are not at the end of the magneto but on top of it. An eccentric adjustment is provided on the distributer gear so that the center distance of the gears can be closely adjusted for correct mesh and quiet running. The distributer shaft is made integral with a disk which sets into a circular recess in the end plate of the housing and is held in place thereon by two machine screws passing through arc-shaped slots. The shaft or stud is eccentric with relation to the disk, and by loosening the retaining screws and turning the stud and disk through a small angle and then tightening the screws again, the distributer gear can be brought closer to or moved farther away from its pinion.



Six-cylinder magneto complete



Distributor brushes removed

Two Distributer Sectors Offset

The distributer itself is in the form of a drum with two metal sectors embedded in a piece of molded insulation. The contact sectors are offset from each other in an axial direction and are spaced 90 deg. circumferentially. There are four carbon brushes (in a four-cylinder magneto) bearing on the surface of the distributer drum, two being carried side by side in each brush holder. The two pairs of brushes are mounted at 90 deg. with each other. One advantage claimed for this construction, in which the brushholders and brushes do not revolve, is that the pressure of the brushes on the distributer is not affected by centrifugal force, and consequently is uniform and comparatively light under all operating conditions, hence the wear of the brushes should be slight. The two sectors of the distributer are integral with a central plug or core of brass, against which the high tension terminal brush bears. It will be noticed that the high tension connection from the coil to the distributer is exceedingly short. The brush holders can be removed without the use of tools.

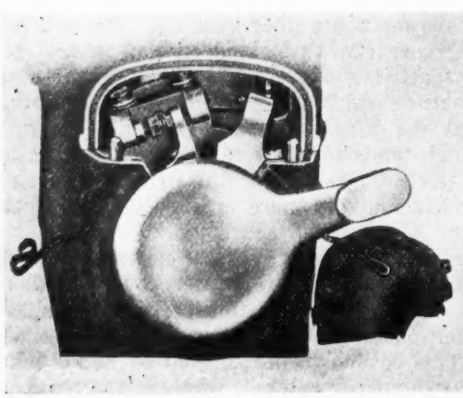
One of the illustrations herewith shows plainly the construction of the primary and secondary connectors. The secondary cables are forced into holes in the molded brush holder and pointed screws are screwed into the blocks from the end, right through the strands of the cable. These screws do not screw in threads in the insulation but in metal blocks molded in same.

Injury From Overoiling Impossible

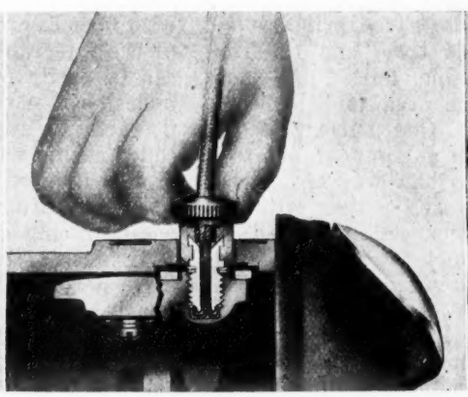
There are oil holes with snap covers at both ends. Owing to the location of the coils and the interrupter points it is impossible to injure the machine by overoiling. The snap cover over the oil hole at the driving end also covers a timing window. In timing the magneto, the rotor is turned until a figure 1 appears centrally in this window; then the engine crankshaft is turned until the piston in No. 1 cylinder is in the top dead center position at the beginning of the firing stroke, and with the rotor and crankshaft in these positions the gears are fastened to their shafts. All of the secondary terminals are plainly marked as to the cylinder to which they are to be connected, and the direction of rotation is indicated by an arrow on top of the magneto.

These magnetos are manufactured in one, two, four, six and eight cylinder types, the eight cylinder type having a four pole magnet. They are made to S.A.E. standard dimensions. It is claimed that they give a spark of sufficient intensity to fire the charge at a very low speed, and also permit of operation at exceedingly high speed, owing to the fact that the revolving masses are of simple and robust form.

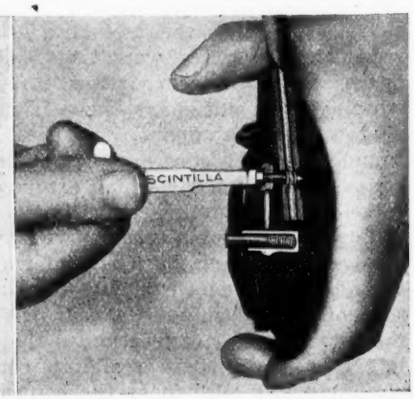
The manufacturing concern in Switzerland is a subsidiary of the firm of Brown, Boveri & Co., which has been engaged in the manufacture of electrical machinery practically since the beginning of that industry.



Interrupter cap removed



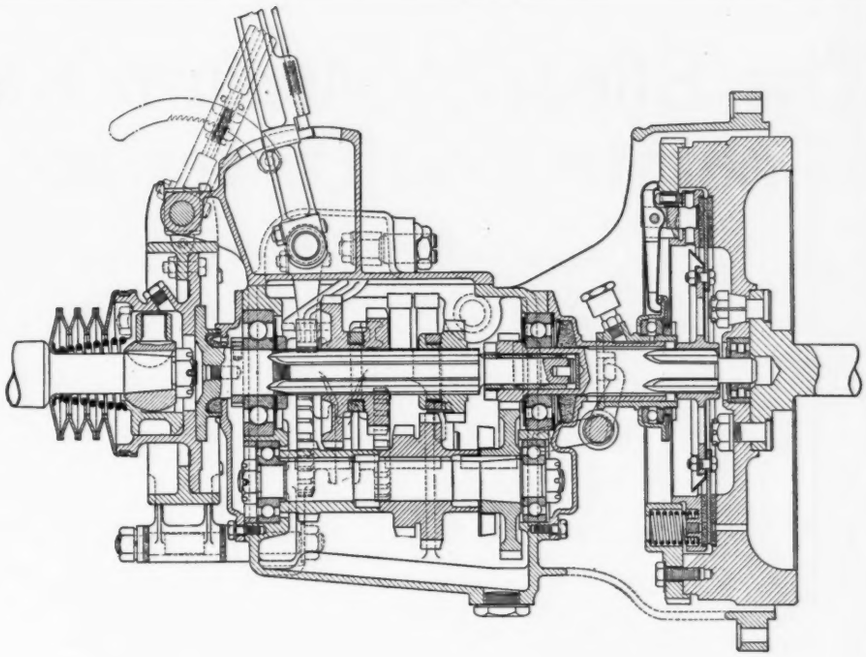
Section of low tension connector



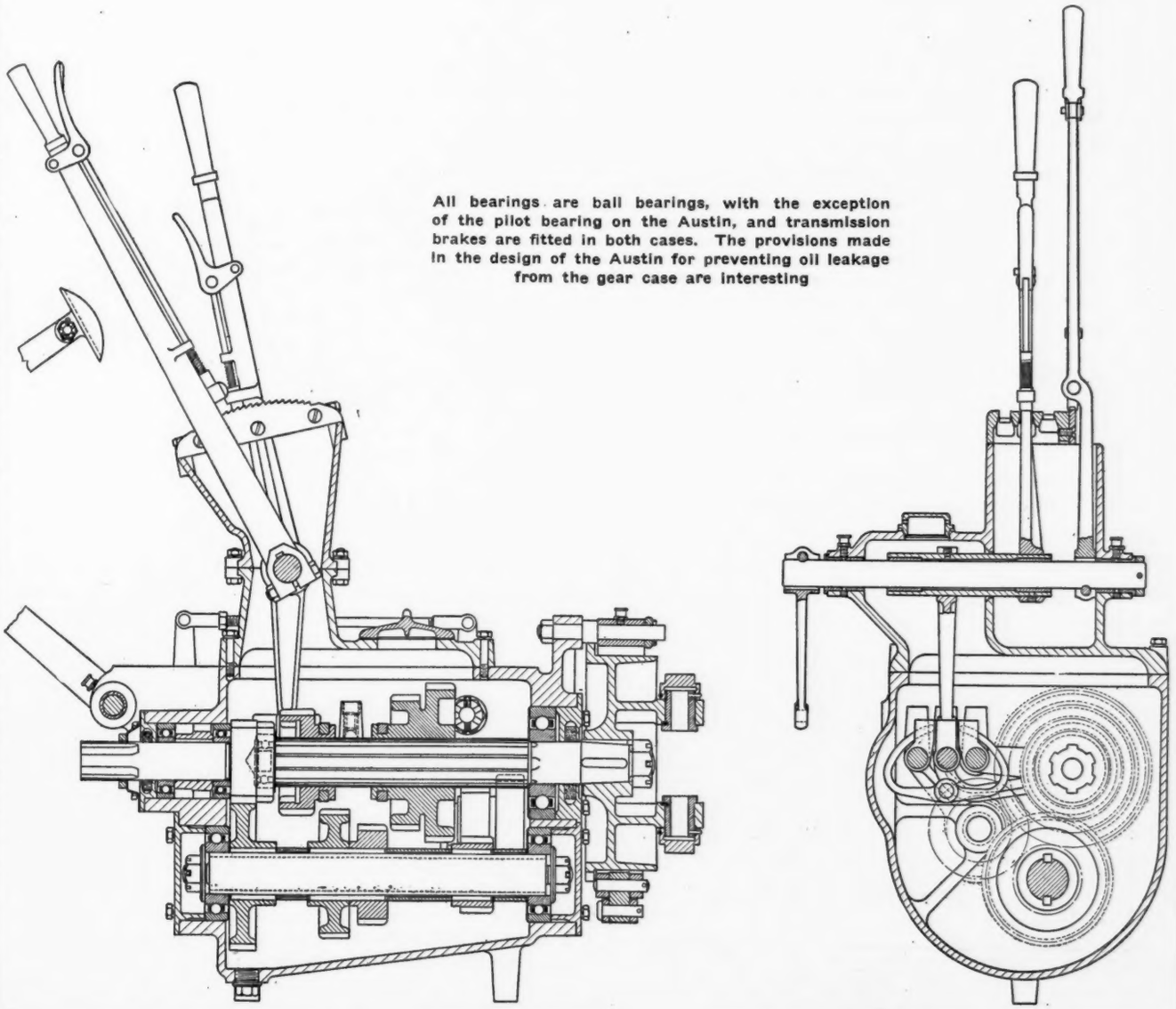
Section of high tension connector

Examples of Recent British Transmission Design

The drawings on this page show two four-speed transmissions of British design—the Austin (above) and the Vulcan (below). It will be noticed that both are arranged for center control, a feature only recently incorporated in British practice. The so-called enclosed gate, which has long been characteristic of British cars, is retained in the new position



All bearings are ball bearings, with the exception of the pilot bearing on the Austin, and transmission brakes are fitted in both cases. The provisions made in the design of the Austin for preventing oil leakage from the gear case are interesting



The Effect of Mixture Ratio and Temperature on Power and Economy

Review of tests conducted at Purdue University shows that marked gains in economy with but trifling loss in power result from proper heating of charge and correct mixture proportions, while smoother performance and less dilution of lubricant are accompanying advantages.

By C. S. Kegerreis*

THE object of this paper is not to develop something entirely new, but to stimulate interest in a few points which have a large bearing on the cost of operating gasoline engines. Large amounts of data have been published, and many improvements have been made the last two or three years, but the public is not getting either the performance or the mileage from the cars that is possible. Who is to blame for the poor operation and short life of the accurately machined car? Is it the manufacturer or is it the driver? Perhaps it is the result of a combination of circumstances.

To operate a car of the present type it is necessary to purchase the commercial fuels sold on the market. Ten years ago the fuel was so volatile that no great attention was required in its preparation for good combustion. Now the carburetion problem has grown to be of such magnitude that it occupies a prominent place in the automotive world.

The troubles experienced are poor operation due to faulty manifold distribution, sooted plugs and combustion chambers, oil dilution, excessive wear on bearings and pistons and low mileage. These factors not only affect the depreciation of the engine but result indirectly in excessive wear on the other parts of the machine.

*The author is connected with the Engineering Experiment Station, Purdue University.

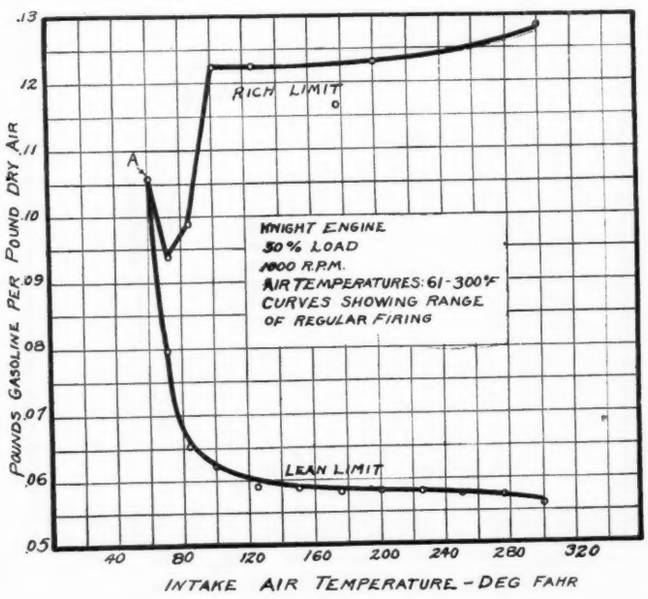


Fig. 1

To remedy the faults the trouble must be removed at the very foundation. Obtaining good performance means research on fuel preparation. Once this problem is solved, then the correct fuel-air ratios can be determined and the exact requirements for mileage ascertained. The Engineering Experiment Station at Purdue University has been working on these problems for the last few years. A portion of the results have been published in bulletin form. The data published in this article is taken from some of the tests, which have been checked, and show the requirements necessary for good performance. Once this is attained, then the question of economy can be solved. The data is based on one grade of gasoline (Table 1) of 56.6 deg. Baumé density. The tests run were made on a four-cylinder engine of modern design and all data taken with great care.

TABLE I.

Distillation Data—56.6 deg. Baumé Gasoline

Initial boiling point		Baumé
Per cent off	98 deg. F.	Reading
10	178	79.8
20	210	73.6
30	248	64.2
40	275	58.6
50	288	55.8
60	306	53.2
70	324	51.0
80	348	49.6
90	374	47.7
98	415	43.3

The data presented all refer to operation at half load at 1000 r.p.m. This approximates car conditions at a medium speed. The various points on all the charts represent at least one separate test and in many cases a long series of tests.

Some means of preparing the fuel for good combustion must be used. Different methods have been tried and heat has shown great possibilities. Fuel cannot burn readily without first being converted into a gas. The carbureter, by atomization, aids in tearing the fuel into small particles, presenting a large surface for vaporization. The decreased pressure in the intake manifold lowers the fuel boiling point, and the fuel is dried to some extent by absorbing heat from the intake valves. The quality of fuel we are now using is too heavy to be sufficiently gasified, even on compression, to give uniform and complete combustion. Thus some additional means of furnishing more heat is necessary. Heat may be added by raising the temperature of air entering the carbureter. Fig. 1 shows the results obtained in

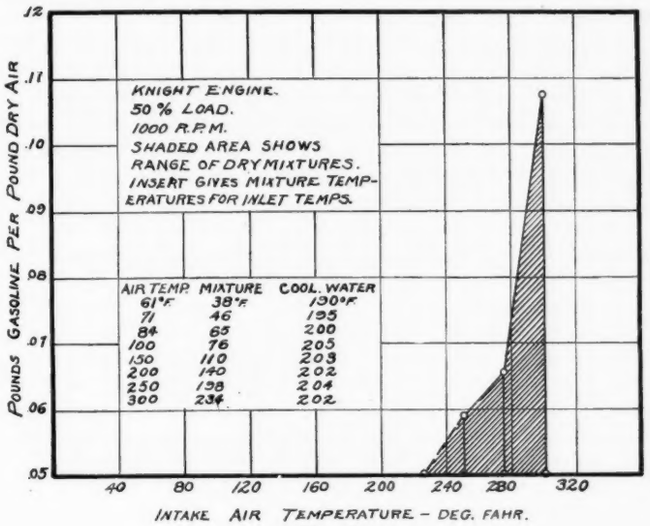


Fig. 2

a series of tests with an inlet air temperature of 61 deg. Fahr. to 300 deg. Fahr. Distributing a very wet mixture is difficult. The curves show that at a lower temperature the quantity of liquid at the end of compression is so great that irregular firing will result. Hence the range is very limited. An inlet temperature of 61 deg. Fahr. is so low that one mixture ratio only will give a semblance of regular firing. This mixture, 0.106 lb. gasoline per pound of dry air, is excessively rich. A large portion is being burned in the exhaust manifold. An increase of 25 deg. in the inlet air temperature to 84 deg. Fahr. creates a big change. The range has widened and the limits are 0.065 to 0.985 lb. gasoline per pound of dry air. The engine fires regularly, but the speed is not constant. There is a tendency to surge and the exhaust is not clean in all cases. A temperature of 100 deg. Fahr. or above gives nearly the maximum firing range.

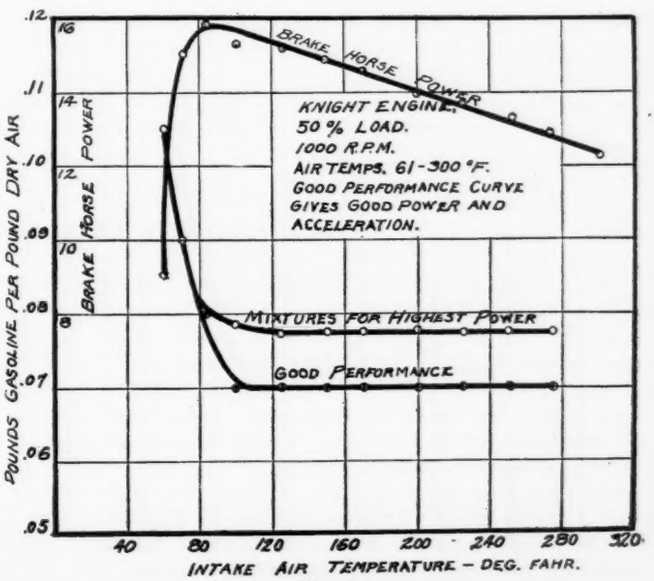
The boundary at the rich end does not follow any definite line. This is due to the excess fuel in the mixture, which causes irregular combustion. The lean limit shows that once 160 deg. Fahr. is reached a much leaner ratio will cause missing or backfiring. It may be of interest to show that if the carburetion is poor some assistance can be obtained by raising the cooling water outlet temperature. On the tests at 61 and 71 deg. Fahr. a low, cooling water temperature would cause the engine to stop. If the temperature was reduced to 160 deg. Fahr. the engine would backfire; if reduced to 120 deg. Fahr. the engine backfired very frequently and at 100 deg. Fahr. the engine would barely run. Even on the 84 deg. Fahr. test series the speed was difficult to control with any mixture.

As the temperature is increased the mixture gradually grows more dry. A glass section was inserted in the manifold so the character of the mixture could be observed at any time. The mixture became quite dry at 225 deg. Fahr. with the leanest ratio used (Fig. 2). The range widened to 0.059 at 250 deg. Fahr. and to 0.1075 lb. gasoline per pound of dry air. The shaded area in Fig. 2 shows the limit of dry mixtures in the ordinary inflammable range. The manifold showed foggy mixtures at lower temperatures. On the same figure will be found the various mixture temperatures for the corresponding inlet air temperatures.

In all cases in the temperature tests at half load and 1000 r.p.m., 160 deg. Fahr. was found to be the minimum desirable temperature for good performance. The engine runs smoothly with no surging, all cylinders firing regularly. Later tests have proved that the combustion is quite complete, and research on other engines shows 160 deg. Fahr. to be the minimum temperature to give a mixture just dry enough to distribute well and burn readily on ignition. Some portions of the fuel may be gasified after ignition. Oil dilution is not entirely eliminated and a warmer mixture is recommended to eradicate this trouble.

The temperature necessary for good performance for this fuel being ascertained, the question regarding power and thermal efficiency arises. Do the mixture requirements for high power change with the temperature of the air? It is a common belief that the colder mixtures give the greater power, as there is a gain in volumetric efficiency. The facts may be studied in Fig. 3. A low temperature requires an excessively rich mixture for high power. With an air temperature of 61 deg. Fahr. a ratio of 0.105 lb. gasoline per pound of dry air is necessary for maximum power development. The absolute value of the power developed is low compared to the higher temperatures. The richness decreases as the temperature increases until 125 deg. Fahr. is attained. Above this point the ratio is constant, 0.0775 lb. fuel per pound of dry air. The peak of the power curve is a bit too rich. A curve labeled good performance is also shown. This plot represents the mixtures that can be used to develop at least 95 per cent of maximum power and give good acceleration. Thus a bit leaner mixture can be used that will pull well, yet give very high efficiency. The fuel consumption can thus be cut 10 per cent and give very good operation. The power loss will not be high; in many cases it is not over 2 per cent.

The inlet air temperature also affects the thermal efficiency. When using low temperatures the efficiency does not peak until the 0.0975 ratio is reached (Fig. 4). At a temperature where good operation is assured the curve peaks at 0.064. There is little improvement above 160 deg. Fahr. In all cases the big improvement occurs between 60 and 125 deg. Fahr. As the mixture for highest efficiency changes with the inlet temperature, the absolute value of the thermal efficiency increases from 7.50 per cent at 61 deg. Fahr., to 18.60 per cent at 84 deg. Fahr. This is a great improvement for so small a temperature increase as 23 deg. Fahr. Above 84 deg. Fahr. the efficiency remains constant up to the temperature corresponding to a dry mixture and then the decrease is small.


BRAKE HORSE POWER
KNIGHT ENGINE.
50 % LOAD.
1000 R.P.M.
AIR TEMPS. 61-300 °F.
GOOD PERFORMANCE CURVE GIVES GOOD POWER AND ACCELERATION.
MIXTURES FOR HIGHEST POWER
GOOD PERFORMANCE
POUNDS GASOLINE PER POUND DRY AIR
INTAKE AIR TEMPERATURE - DEG. FAHR.
Fig. 3

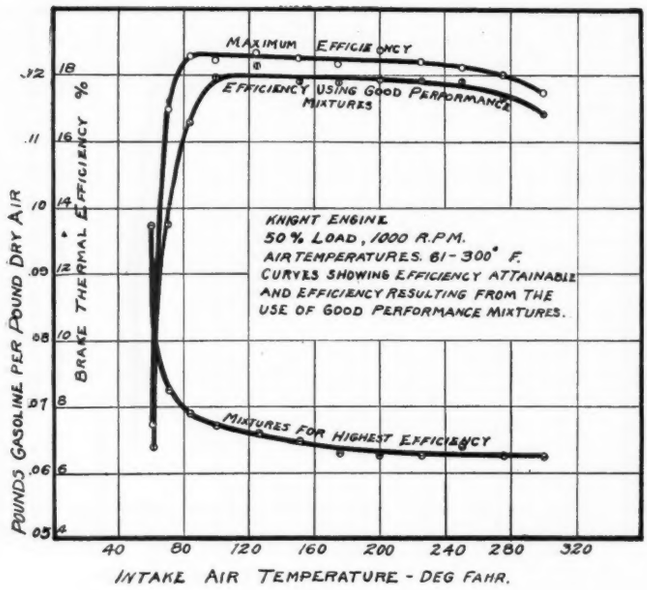

MAXIMUM EFFICIENCY
EFFICIENCY USING GOOD PERFORMANCE MIXTURES
KNIGHT ENGINE
50% LOAD, 1000 R.P.M.
AIR TEMPERATURES. 61-300° F.
CURVES SHOWING EFFICIENCY ATTAINABLE AND EFFICIENCY RESULTING FROM THE USE OF GOOD PERFORMANCE MIXTURES.
MIXTURES FOR HIGHEST EFFICIENCY
POUNDS GASOLINE PER POUND DRY AIR
BRAKE THERMAL EFFICIENCY %
INTAKE AIR TEMPERATURE - DEG FAHR.
40 80 120 160 200 240 280 320

Fig. 4

In Fig. 3 is plotted the relation between temperature of inlet air and the proportion of mixtures that will give good performance. By using these mixtures a thermal efficiency within 1 per cent of the maximum can be attained. This means high mileage per gallon plus good and smooth running.

The preceding data establish the limits of good operation, power and efficiency as affected by the inlet air or mixture temperature. With the engine running properly the relation between power and thermal efficiency, as effected by the mixture ratio, can be accurately determined. The curves shown in Fig. 5 are the results of run at half load and 1000 r.p.m. In this series a constant throttle opening was used for all tests, and the carbureter adjustment changed throughout the mixture range. The engine fired every cylinder regularly for all ratios between 0.0576 and 0.1275 lb. gasoline per pound of dry air. With leaner mixtures the engine would miss and backfire.

The power peaks at 0.0775 and the thermal efficiency at 0.065. It can be clearly seen in this figure that 0.07 represents a mixture giving negligible decrease in power from the maximum. By using 0.07 instead of 0.0775 a gain in efficiency of 1.5 per cent is made. The ratio 0.0672 represents the chemically perfect mixture with no excess of oxygen and no carbon monoxide in the exhaust. In this series of tests this ratio gave maximum efficiency with satisfactory operation.

It often happens that two cars of the same manufacture, both in good mechanical condition and using the same air intake temperature, show widely different mileages; one may make 12 miles and the other 20 miles per gallon. It will be seen from the data represented herewith that both may develop the same power and climb the same hills and yet the economy may be very different. Fig. 5 shows a range in performance varying from a 0.07 fuel ratio and 18.3 per cent thermal efficiency to a 0.105 mixture ratio and 12 per cent efficiency.

An engine, to deliver its maximum efficiency, must first have the fuel prepared correctly and then be fed the required mixture for all conditions. Medium or low-priced fuels will not be available long. Even without increase in consumption, the price would be sure to rise and the volatility to decrease. Thus it behooves everyone from the driver to the engineer or capitalist to endeavor to prevent waste of fuel.

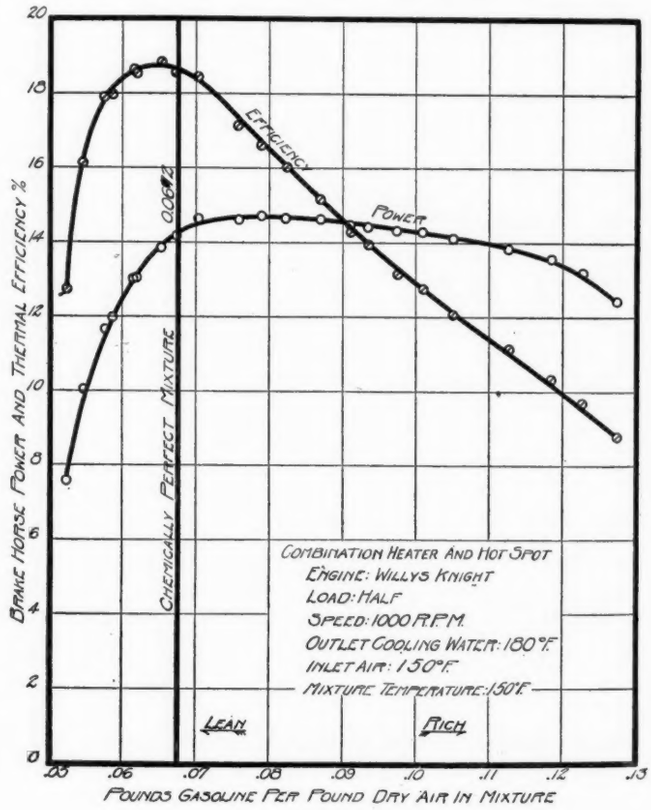


Fig. 5

Diminutive Ignition Apparatus

SINCE the war there have been developed in Germany a whole series of exceedingly small internal combustion engines, some with as small a bore as 40 mm. (1.575 in.), which at 3000 r.p.m. develop from 1 to 1½ hp.. It is practically impossible to mount magnetos of normal dimensions on these engines, and in view of this fact the German ignition industry has produced new ignition devices of corresponding size.

About a year and a half ago the firm of R. Bosch bought out a small rotary ignition device or flywheel magneto which weighs only 2.2 lb., and is intended for small single and twin cylinder engines of either the two or four-stroke type. The permanent magnet is of ring form, which makes it possible to mount the instrument directly on the crankshaft instead of on the flywheel, thus effecting a saving of weight. Bosch has also brought out a very small spark plug, which has an overall height of only 1⅝ in. The thread has a diameter of 12 mm. (0.473 in.) and a pitch of 1.25 mm. (19.5 threads to the inch). The weight of the plug is only one ounce. A wire clip connector is used with the plug.

METALL-TECHNIK reports that the addition of 1/5 per cent of metallic beryllium to aluminum results in a light alloy of far better properties than the well-known alloy, magnalium (magnesium-aluminum).

Experiments With a Reversible Propeller at McCook Field

New device appears to be capable of improving airplane performance through use of variable pitch feature, and promises also to facilitate landing in limited space, and thus aid in solution of landing field problem.

THE invention of the Hart reversible and variable pitch propellers has opened a new field of development for aviation, and appears to be a big step in the improvement of airplane performance, as well as a step toward the solution of the landing field problem.

This propeller was invented by Seth Hart of Los Angeles, Cal. Several propellers were built by Mr. Hart at his own expense in California, and a number of flights were made there by several pilots. The California flights showed such promise of success that Mr. Hart determined to bring the invention before the Government's Airplane Engineering Division at McCook Field early in 1918, and since that time the Army has made many tests and worked out a number of new applications.

The first propeller delivered was given a destructive whirling test to determine the strength of the device. The construction employed proved to have such remarkable strength that the propeller, with a few modifications, was installed on the JN-4-H airplane for flight test.

The flights with this original propeller extended over a period of about 8 hr. in the air. The principal advantages brought out by these tests were the following: As compared with the fixed pitch propeller, the variable pitch propeller showed an increase in the rate of climb of about 40 per cent, an improvement in ceiling of about 20 per cent, and great gain in the time required for take-off.

Ten of the Hart propellers have been built for such engines as the Liberty 12, Hispano-Suiza, 300-hp. and Hispano-Suiza 150-hp. engines, but to date the reversible feature of the Hart propeller has been tested only on the JN-4-H airplane.

The airplane fitted with this propeller has been flown and landed by different pilots in order to determine the difference in the distance required for landing with and without the reversible feature. The average of fourteen landings was taken. The result of this test determined that approximately 430 ft. was required to land the plane without the use of the reversible propeller, while a distance of only 120 ft. was needed to land the plane with the reversible propeller. While this comparison on the JN-4-H shows a remarkable reduction in the distance required for landing, it is probable that a greater decrease in landing distance will be found with some of the faster planes.

The further development of this propeller suggests many possibilities; such as landing on roofs of buildings or on platforms erected on shipboard.

The use of reversible propellers on dirigible balloons has been developed by a number of foreign nations, and they are considered essential to airships of very large size. The Hart propeller, on account of its light weight, strength and adaptability, is considered a great improvement for this service.

It should be borne in mind that the reversible feature of the Hart propellers is always combined with the variable pitch feature, and it is possible to adjust the propeller during flight at any angle from a full reverse position to an angle several degrees greater than the normal full ahead position.

In actual operation the Hart propeller is set at low pitch for take-off and climbing. The low pitch gives a good ratio of thrust to torque on the ground, and consequently gives a high thrust and rapid take-off. After leaving the ground the low pitch allows the engine to turn up as fast as desired, giving a very rapid climb. After reaching the desired altitude the propeller may be adjusted to a somewhat greater pitch in order to allow the engine to turn at the proper speed and give the highest airplane speed in level flight.

When it is desired to cruise for long distances the pitch of the propeller is increased still further, holding the engine down to considerably slower speed without appreciable loss of plane speed. The advantages of adjusting the propeller to very high pitch in cruising and throttling the engine only slightly are two-fold over the fixed pitch propeller, in which the engine is greatly throttled: (1) The high pitch ratio obtained considerably increases the propeller efficiency; (2) by throttling only slightly, the gasoline consumption of the engine in pounds per horsepower hour is approximately as low as at full throttle. In the case of the fixed pitch propeller, however, where the engine is greatly throttled, there is considerable loss in fuel economy.

The use of variable pitch propellers will probably be essential for airplanes fitted with steam engines or steam turbines, Diesel type engines and engines with superchargers or other devices for maintaining the power at high altitudes. The difficulty encountered with the fixed propeller for this service is as follows: If the propeller is designed to operate at the normal revolutions near the ground the engine will turn it altogether too fast at high altitudes, resulting in racing the engine on account of the lower resistance of the less dense air. On the other hand, if the propeller is designed for operations at high altitudes, it will turn so slowly near the ground as to seriously impair the performance of the airplane when leaving the ground. In the case of the variable pitch propeller, it is possible to set the blades at such a pitch near the ground as to give a proper speed of revolution to the engine and to increase the pitch as higher altitudes are reached, thus preventing the engine from over-speeding.

Many destructive tests on these propellers have been made at McCook Field, and they have shown an ample factor of safety.

The method of computing the rate of retardation of the propeller when landing with and without reversible propeller and when the propeller is reversed in flight has been worked out at McCook Field.

The Alinement Chart

An exposition of the principles underlying the construction of alinement charts. These charts lend themselves to the graphical representation of mathematical relations of many different forms and in their practical application save a great deal of calculation work.

By C. W. Crockett**

THE purpose of this article is to present a basis for the construction of alinement charts and a method of interpreting charts which may come to the reader's attention, and the essence of the article is the notation shown in Fig. 1, which is the alinement chart for

$$w = au + bv, \text{ or } w - au = bv, \text{ or } w - au - bv = o,$$

where the coefficient of w is unity. UU' and VV' are parallel lines, making any angle with UV, and they may extend below as well as above UV. A scale of equal parts is laid off on UU', beginning at U and such that 1 inch on UU' represents r units in u. Another scale of equal parts is laid off on VV', beginning at V and such that 1 inch on VV' represents s units in v. Then a third line WW', parallel to UU' and VV', is drawn at a distance $D_u = UW$ from UU' such that

$$D_u = \frac{sb}{ra + sb}\, m$$

where $m = UV$. Then, finally, a scale of equal parts is laid off on WW', beginning at W and such that 1 inch on WW' represents $t = ra + sb$ units in w. If now any transversal $U_1W_1V_1$ is drawn,* the numbers read at W_1, U_1 and V_1 will be a set of values of w, u and v, respectively, which will satisfy the equation

$$w = au + bv.$$

**Professor of mathematics and astronomy, Rensselaer Polytechnic Institute.

*The demonstration is given later in this article.

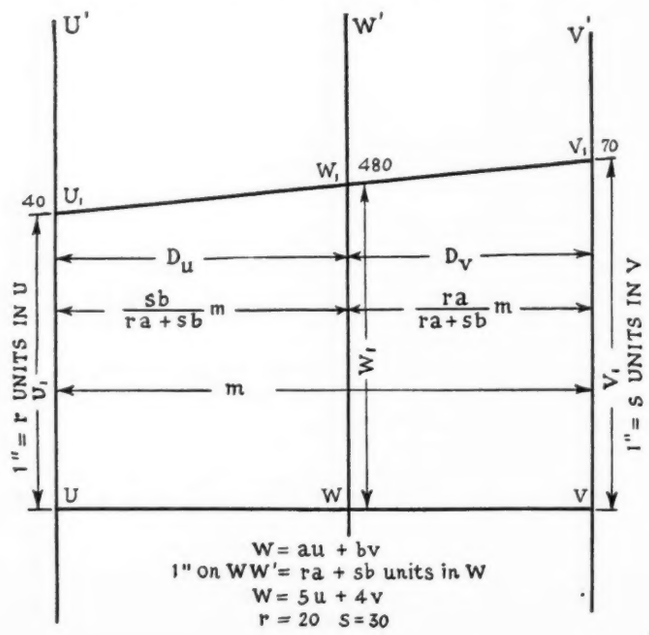


Fig. 1

Since

$$t = ra + sb \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

and, from Fig. 1,

$$\frac{D_u}{D_v} = \frac{sb}{ra} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

and

$$D_u + D_v = m \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

it is evident that the scales t, r and s must satisfy eq. (1), while the distances D_u, D_v and m must satisfy eqs. (2) and (3). If we assume the value of r or of s or of t, and also assume the value of D_u or of D_v or of m, and then assume the value of any one of the other four quantities, the values of the remaining three may be computed from eqs. (1), (2) and (3).

Fig. 1 shows the relative positions of the three scales for the equation

$$w = 5u + 4v$$

when $r = 20$ and $s = 30$. Since $a = 5$ and $b = 4$, we have

$$t = ra + sb = 20 \times 5 + 30 \times 4 = 220$$

and

$$D_u = UW = \frac{30 \times 4}{220}\, m = \frac{6}{11}\, m$$

and

$$D_v = VW = \frac{20 \times 5}{220}\, m = \frac{5}{11}\, m$$

so that, if $UV = 11$ in., $D_u = 6$ in. and $D_v = 5$ in. Positive values of u are found on UU' above UV, and negative values are found below UV; and positive and negative values of v and w are similarly located.

The same chart, Fig. 1, may be used for

$$w = 5u + 4v + 30$$

if the number of W is 30 instead of zero. It may be used for

$$w = 5u + 30 = 5u + 4(0) + 30$$

if the number at W is 30 instead of zero and if all the transversals pass through V (since $v = 0$).

The same chart may be used when w, u and v are expressions each containing a single variable, if the lines are properly numbered. Thus, if

$$1 + z^2 = 5\sqrt{1 + x^2} + 4\,(1 + y)^3,$$

put $u = \sqrt{1 + x^2}$, assume values of x, compute the corresponding values of u, locate the points on UU' (using the scale r), and mark the points with the corresponding values of x. Similarly locate points on VV' corresponding to the values of $(1 + y)^3$ and mark them with the values of y; and locate points on WW' corresponding to the values of $1 + z^2$ and mark them with the values of z. Then a

transversal will give a set of values of x, y and z which will satisfy the equation.

When the Coefficients Are Negative

If we wish to form an alinement chart for

$$w = -5u + 4v,$$

there are two methods of procedure.

In the first method we consider the negative sign as being united with the variable u, so that

$$w = 5\,(-u) + 4v.$$

Here $a = +5$ and $b = +4$, but the positive values of u must be found on UU' extended *below* U. That is, the same alinement chart may be used for

$$w = 5u + 4v, \qquad w = -5u + 4v,$$
$$w = 5u - 4v, \qquad w = -5u - 4v,$$

if a *and* b *are the numerical values of the coefficients of* u *and* v, *and if the positive values of a variable whose coefficient is negative are found below* UV.

In this method WW' is always between UU' *and* VV'.

In the second method we consider the negative sign as being united with the constant, so that, if

$$w = -5u + 4v,$$

we have

$$a = -5 \text{ and } b = +4.$$

In this method the value of D_u or of D_v or of t may be negative. Fig. 1 shows the relative positions of the lines UU', VV' and WW' when a and b are positive; that is, $D_u = UW$ is positive when measured from U toward V, and $D_v = VW$ is positive when measured from V toward U. The notation in Fig. 1, and eqs. (1), (2) and (3) are applicable, not only when a and b are positive, but also when either a or b or both are negative, using the algebraic values of a and b and remembering that WW' is to the left of UU' when D_u is negative and to the right of VV' when D_v is negative, and that, if $ra + sb$ is negative, the positive values of w are found below W.

Thus, if

$$w = -5u + 4v$$

and $r = 20$ and $s = 30$, and $m = 2$ inches, we find

$$t = ra + sb = 20\,(-5) + 30\,(4) = +20,$$
$$D_u = +12 \text{ inches and } D_v = -10 \text{ inches},$$

so that WW' should be drawn 10 inches to the right of VV', and 1 inch on WW' should represent 20 units in w, the positive values of w being above UV.

The two methods may be combined so that various alinement charts may be formed for the same equation. Thus we may write

$$w = 5u + 4v$$

in the form

$$w = 5u - 4\,(-v)$$

so that $a = +5$ and $b = -4$, and the positive values of v will be found below UV. Since

$$t = 20\,(5) + 30\,(-4) = -20,$$

the positive values of w will be found below W.

Logarithmic Scales

To form an alinement chart for

$$z = x^a y^b$$

we write

$$\log z = a \log x + b \log y$$

which is in the form

$$w = au + bv$$

if $\log z = w$, $\log x = u$ and $\log y = v$, and therefore, in Fig. 1, we use logarithmic scales, instead of scales of equal parts, on UU', VV' and WW'.

Construct a logarithmic scale on UU', with the scale* r, such that each distance UU_1 shall equal $\frac{1}{r} \log x$, and mark the corresponding value of x at the point U_1. Also, construct a logarithmic scale on VV', with the scale s, marking the points with the corresponding values of y. The notation in Fig. 1, and eqs. (1), (2) and (3) are applicable. A logarithmic scale, with the scale

$$t = ra + sb,$$

should be constructed on WW', the points being marked with the corresponding values of z. Then a transversal $U_1W_1V_1$ will give a set of values of x, z and y that will satisfy the equation

$$\log z = a \log x + b \log y$$

or

$$z = x^a y^b$$

Note that the points U, W and V will each be marked 1, since $\log 1 = 0$, and that the logarithms of numbers less than one are negative so that they should be found below UV.

If

$$z = cx^a y^b$$

so that

$$\log z = \log c + a \log x + b \log y,$$

we have

$$\log \frac{z}{c} = a \log x + b \log y.$$

Construct the alinement chart as before, but place unity on WW' below W at a distance corresponding to $\log c$ on the scale

$$t = ra + sb,$$

that is, at a distance

$$\frac{1}{ra + sb} \log c.$$

When, in the equation

$$\log z = a \log x + b \log y,$$

either the coefficient of $\log x$ or that of $\log y$ or the coefficient of both $\log x$ and $\log y$ are negative, the alinement chart may be formed by methods the same as those used for

$$w = au + bv$$

but using logarithmic scales on UU', VV' and WW'. Thus, if

$$z = x^{1.3} y^{-2.4},$$

we may write

$$\log z = 1.3 \log x - 2.4 \log y$$

where $w = \log z$, $u = \log x$, $v = \log y$, $a = 1.3$, $b = -2.4$. Or we may write

$$\log z = 1.3 \log x + 2.4\,(-\log y)$$

where $a = 1.3$ and $b = +2.4$, the positive values of $\log y$ being laid off below V.

If

$$z = x^m y^n$$

we have

$$\log z = m \log x + n \log y$$

which may be written in the form

$$\log z = 1\,(m \log x) + 1\,(n \log y),$$

so that $w = \log z$, $u = m \log x$, $v = n \log y$, $a = 1$, $b = 1$. Assume a value for x, compute the value of $m \log x$, lay off the corresponding distance from U on UU' using the scale r, and mark the point with the assumed value of x. Form the VV' scale in a similar manner. The WW' scale is a logarithmic scale with $t = r + s$.

*If 4 in. on VV' represents $\log 10$ $(= 1)$ then 1 in. represents $\frac{1}{4}$ or 0.250. So that $r = \frac{1}{4} = 0.250$.

The Z-Diagram

This diagram is used to obtain, without the use of logarithmic scales, the solution of the equation

$$v = cku$$

where v, k and u are variables.

Consider the construction of the alinement chart for

$$w = -au + bv \quad \ldots\ldots (4)$$

by the first method, in which the negative sign is used conjointly with u, while a is considered positive, the positive values of u being below U while the positive values of v are above V. Then, if $UV = m$,

$$UW = \frac{sb}{ra + sb} m$$

and the point W is fixed, if a and b are constant quantities.

If $w = 0$, the transversal U_1V_1' is drawn through W, and the value of u at U_1 and the value of v at V_1' satisfy the equation $0 = -au + bv$

or $$v = \frac{a}{b} u.$$

Comparing this with

$$v = cku,$$

we have

$$\frac{a}{b} = ck$$

or $$a = bck$$

and, therefore, $$UW = \frac{s}{rck + s} m.$$

A third scale, the *k-scale*, may now be constructed on the line UV. Thus, if $r = 2s$ for example, we have

$$UW = \frac{1}{2ck + 1} m.$$

Compute the values of UW corresponding to different values of k, and mark the corresponding points on UV with the proper value of k. Then a transversal through any value of u, found on UU', and through any value of k, found on UV, will pass through the corresponding value of v, found on VV'.

Two Straight and One Curved Scales

An alinement chart for

$$w = au + bv,$$

where w, a and b are expressions each containing a single variable z, may be constructed as follows:

For example, let

$$z^2 = u\,(1 + z) + v\,(2 + z)$$

where $$w = z^2, a = 1 + z, b = 2 + z.$$

Construct the UU' and VV' scales as in Fig. 1. The straight line WW' is replaced by a curve, each point on which is determined as follows: Assume a numerical value of z, compute the corresponding values of w, a and b; then compute the values of D_u and w_1 from the formulas

$$D_u = \frac{sb}{ra + sb} m \quad \text{and} \quad w_1 = \frac{w}{ra + sb};$$

and then locate the point W_1 by using these values of D_u and w_1.

Thus, if $r = 20$ and $s = 30$, and if we assume $z = 6$, we find $w = 36$, $a = 7$, $b = 8$, $D_u = \frac{12}{19} m$, $w_1 = \frac{9}{95}$; locate the point W_1 by using $D_u = \frac{12}{19} m$ and $w_1 = \frac{9}{95}$ of an inch; and mark the value of z $(= 6)$ at W_1.

The same method may be used when any one or more of the three quantities w, a and b is constant.

Demonstration of Fig. 1

Let u' and v', and u'' and v'', be sets of values of u and v which, substituted in

$$w = au + bv \quad \ldots\ldots (a)$$

will produce the same value of w; that is,

$$w = au' + bv' \quad \ldots\ldots (b')$$

$$w = au'' + bv'' \quad \ldots\ldots (b'')$$

On UU' (Fig. 3) lay off

$$UU_1 = u_1 = \frac{u'}{r} \text{ and } UU_2 = u_2 = \frac{u''}{r} \quad \ldots\ldots (c)$$

since one inch on UU' represents r units in u; and on VV' lay off

$$VV_1 = v_1 = \frac{v'}{s} \text{ and } VV_2 = v_2 = \frac{v''}{s} \quad \ldots\ldots (d)$$

since one inch on VV' represents s units in v.

We wish to find the point W_1 where the straight lines U_1V_1 and U_2V_2 intersect.

Considering the line U_1V_1, we have

$$WW_1 = u_1 + \frac{v_1 - u_1}{m} UW \quad \ldots\ldots (e)$$

Considering the line U_2V_2, we have

$$WW_1 = u_2 + \frac{v_2 - u_2}{m} UW \quad \ldots\ldots (f)$$

$$\therefore u_1 + \frac{v_1 - u_1}{m} UW = u_2 + \frac{v_2 - u_2}{m} UW$$

$$UW = \frac{(u_2 - u_1)\, m}{v_1 - v_2 - (u_1 - u_2)} = \frac{s\,(u'' - u')\, m}{r\,(v' - v'') - s\,(u' - u'')}$$

But, subtracting (b'') from (b'),

$$v' - v'' = -\frac{a}{b}(u' - u'')$$

and $$\therefore UW = \frac{sb}{ra + sb} m \quad \ldots\ldots (g)$$

Then, from (e),

$$WW_1 = \frac{u'}{r} + \frac{rv' - su'}{rs} \frac{sb}{ra + sb} = \frac{au' + bv'}{ra + sb} = \frac{w}{ra + sb} \quad \ldots\ldots (h)$$

If u''' and v''' is any other set of values of u and v which, substituted in equation (a), will produce the same value of w, so that $w = au''' + bv'''$,

and if $UU_3 = u_3 = \frac{u'''}{r}$ and $VV_3 = v_3 = \frac{v'''}{s}$, the line U_3V_3 will pass through the point W_1; for the distance from W to the point where U_3V_3 interesects WW' is

$$u_3 - \frac{u_3 - v_3}{m} UW = \frac{u'''}{r} - \frac{su''' - rv'''}{rs} \frac{sb}{ra + sb}$$

$$= \frac{au''' + bv'''}{ra + sb} = \frac{w}{ra + sb}$$

as before.

From equation (g) we see that UW is a constant, so that the point W_1 must be on a line WW' parallel to UU' and VV', and from equation (h) we see that WW_1 depends upon the value of w and not upon the values of u and v.

Alinement Chart for Helical Springs

The accompanying alinement chart was designed to determine the diameter of the wire and the mean diameter of the coil of a helical spring formed of round steel wire, if the amount of compression or extension, the maximum load and the solid height are given, and to determine the extreme fiber stress under that load.

The formulas for helical springs made of round wire are

$$P = \frac{\pi S d^3}{8 D} \quad \ldots\ldots (5)$$

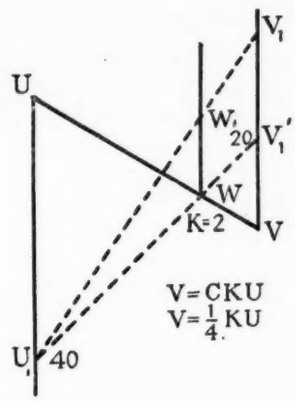


Fig. 2

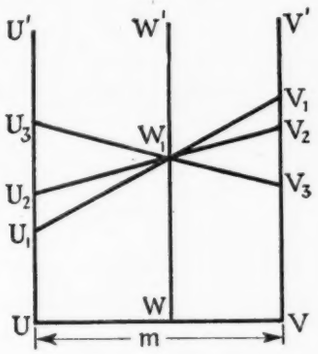


Fig. 3

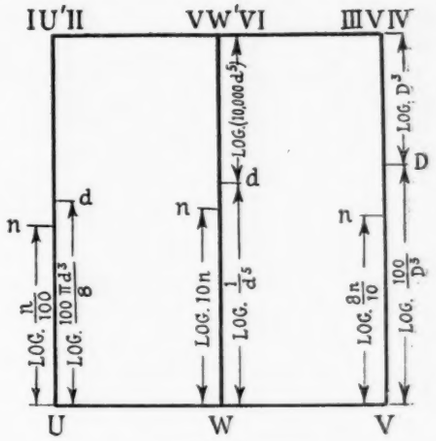


Fig. 4

and $$F = \frac{8\,P\,h\,D^3}{G\,d^5} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

where P = load in pounds,
d = diameter of wire in inches,
D = mean diameter (or pitch diameter) of coil in inches,
F = total compression or extension under load P,
h = solid height,
S = stress on extreme fiber,
G = modulus of torsional elasticity.

The lines UU', WW' and VV' are perpendicular to UV and $U'V'$, WW' being midway between UU' and VV'. The distance UV may be any quantity, but, as here described, the distance UU' must be 8 inches.*

Scale I. On the left of UU', from U lay off upward a scale, marking the number n at a distance 4 $\log\frac{n}{100}$ above U.

Scale II. On the right of UU', from U lay off upward a scale, marking d at a distance 4 $\log\frac{100\,\pi\,d^3}{8}$ above U. Note that $d = \frac{1}{4}$ is below U.

Scale III. On the left of VV', from V lay off upward a scale, marking n at a distance 4 $\log\frac{8n}{10}$ above V.

Scale IV. On the right of VV', from V' lay off *downward* a scale, marking D at a distance 4 $\log D^3$ below V'.

Scale V. On the left of WW', from W lay off upward a scale, marking n at a distance 2 $\log 10n$ above W.

Scale VI. On the right of WW', from W' lay off *downward* a scale, marking d at a distance 2 $\log (10{,}000\,d^5)$ below W'.

All the distances are in inches, unity in the logarithm being represented by 4 inches on UU' and VV', and by 2 inches on WW'.

The use of the chart may be illustrated by indicating the solution of the following problem: Find the values of d and D if the spring is compressed 8 inches to a solid height of 5 inches by a weight of 500 pounds, if G = 12,000,000, neglecting the ineffective coils.

(a) Draw a straight line through $P = 500$ on Scale I and $h = 5$ on Scale III, and mark the intersection I_1 on WW'.

(b) Draw a straight line I_1 and $100F = 800$ on Scale I, and mark the intersection I_2 on VV'.

(c) Draw a straight line through I_2 and $\frac{1}{1{,}000{,}000}\,G =$ 12 on Scale V, and mark the intersection I_3 on UU'.

(d) Draw a straight line through I_3, and its intersections with WW' and VV' will give, on Scales VI and IV respectively, values of d and D which will permit the assigned deflection, one set of values being $d = \frac{3}{8}$" and $D = 3\,5/16$".

To determine the extreme fiber stress:

(e) Draw a straight line through $P = 500$ on Scale I and $D = 3\,5/16$ on Scale III, and mark the intersection I_4 on WW'.

(f) Draw a straight line through I_4 and $d = \frac{3}{8}$ on Scale II, and its intersection with VV' will give, on Scale III, the value of $\frac{1}{10{,}000}\,S = 8.0$, so that S = 80,000 pounds.

To determine the resulting deflection (as a check):

(g) Draw a straight line through $P = 500$ on Scale I and $\frac{1}{1{,}000{,}000}\,G = 12$ on Scale V, and mark the intersection I_5 on VV'.

(h) Draw a straight line through I_5 and $d = \frac{3}{8}$ on Scale VI, and mark the intersection I_6 on UU'.

(i) Draw a straight line through I_6 and $h = 5$ on Scale III, and mark the intersection I_7 on WW'.

(j) Draw a straight line through I_7 and $D = 3\,5/16$ on Scale IV, and the intersection with UU' will give, on Scale I, the value of $100F$, which should be approximately 800, since F should be 8 inches.

Graphical representations of these lines are given on the chart between UU' and WW', where the transversal lines are lettered (a), (b), and so on, in order in which they should be drawn, and the letters P, h, and so on, are placed to the left or right of the vertical line according to the position of the scale on which the quantity should be found.

The explanation of the theory of this chart is as follows:

We have assumed that 4 inches shall represent log 10 = 1 on UU' and VV' so that $r = s = \frac{1}{4}$, and that 2 inches shall represent log 10 on WW' so that $t = \frac{1}{2}$. Since WW' is placed midway between UU' and VV', we must have $ra = sb$. Combining the equations

$$r = s = \tfrac{1}{4},\ ra = sb,\ t = ra + sb = \tfrac{1}{2},$$

we find $$a = b = 1$$

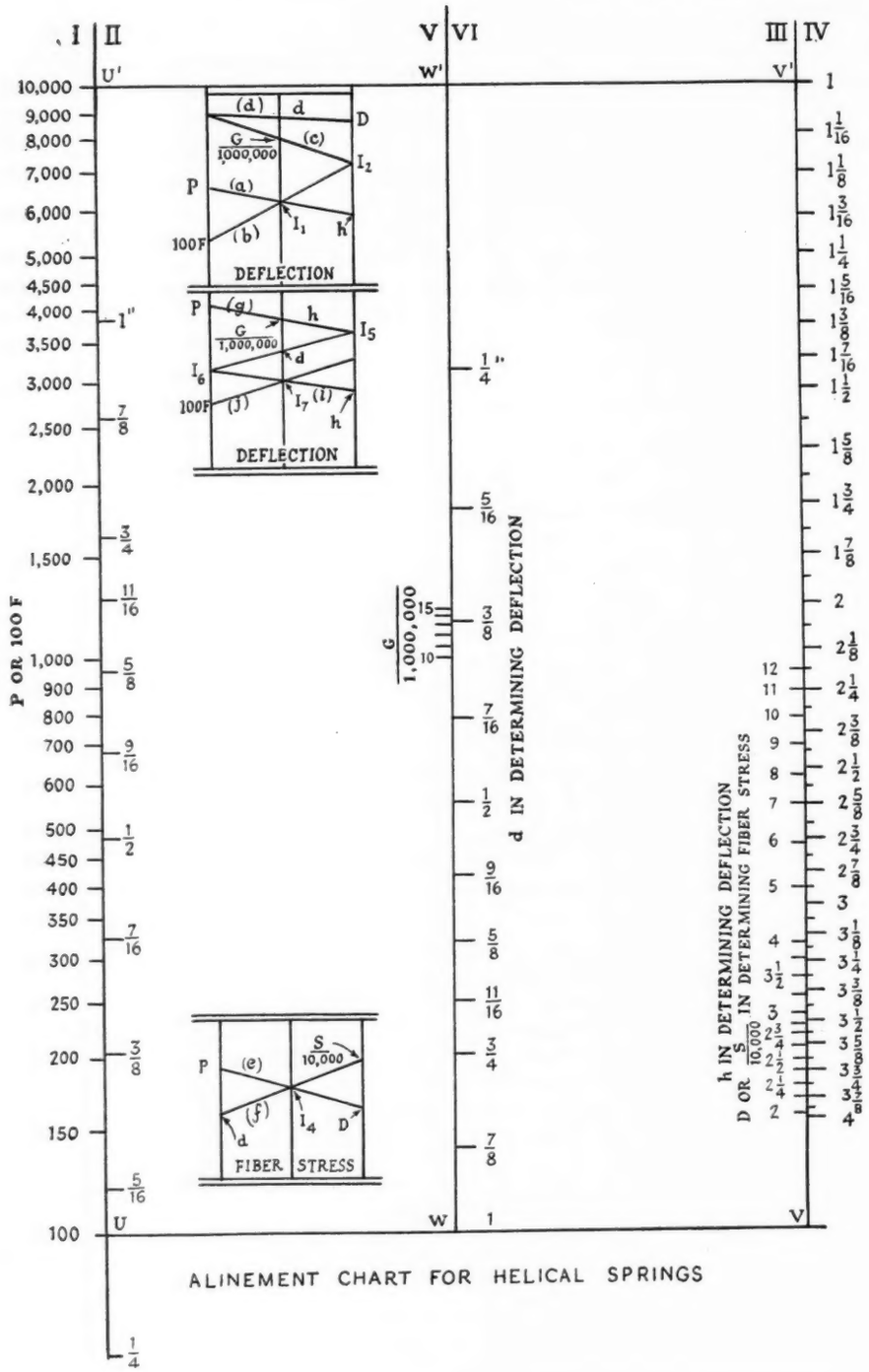
so that our logarithmic equations should be in the form

$$\log z = \log x + \log y$$

or $$\log z - \log x = \log y.$$

Fig. 4 shows the quantities represented by the corresponding distances on the several scales. The powers of 10 are introduced to move the scales up or down so that the portions containing the numbers which occur in practice

*All vertical distances may be increased in the same proportion.



ALINEMENT CHART FOR HELICAL SPRINGS

shall be placed near each other. The results of the several operations are:

(a) $\log \frac{P}{100} + \log \frac{8h}{10} = \log I_1$;

$$\therefore I_1 = \frac{8hP}{1000}.$$

(b) $\log I_1 - \log F = \log I_2$;

$$\therefore I_2 = \frac{8hP}{1000F}.$$

(c) $\log \frac{10G}{1{,}000{,}000} - \log I_2 = \log I_3$;

$$\therefore I_3 = \frac{FG}{800hP}.$$

(d) $\log \frac{1}{d^3} - \log I_3 = \log \frac{100}{D^3}$;

$$\therefore \frac{8hP}{FGd^3} = \frac{1}{D^2}$$

which is one form of Eq. (6).

(e) $\log \frac{P}{100} + \log \frac{8D}{10} = \log I_4$;

$$\therefore I_4 = \frac{8PD}{1000}.$$

(f) $\log I_4 - \log \frac{100\pi d^3}{8}$

$$= \log \frac{8S}{100{,}000};$$

$$\therefore \frac{8PD}{\pi d^3} = S$$

which is one form of Eq. (5).

(g) $\log \frac{10G}{1{,}000{,}000} - \log \frac{P}{100} = \log I_5$

$$\therefore I_5 = \frac{G}{1000P}.$$

(h) $\log \frac{1}{d^3} - \log I_5 = \log I_6$;

$$\therefore I_6 = \frac{1000P}{Gd^3}.$$

(i) $\log I_6 + \log \frac{8h}{10} = \log I_7$;

$$\therefore I_7 = \frac{800hP}{Gd^3}.$$

(j) $\log I_7 - \log \frac{100}{D^3} = \log F$;

$$\therefore \frac{8hPD^3}{Gd^3} = F$$

which is one form of Eq. (6).

Heat Treatment of Molybdenum Steel

A REPORT of tests of heat-treated carbon-molybdenum and chromium-molybdenum steels has been completed by the Bureau of Standards.

Among the conclusions reached regarding steel containing 0.20 per cent carbon and 1 per cent molybdenum are the following: For the production of definite tensile strength, water quenching is to be preferred on account of the higher proportional limit, ductility and impact values obtained, and, conversely, better tensile properties are obtained for a given impact resistance.

Raising the quenching temperature from 1670 deg. Fahr. to 1795 deg. Fahr. does not materially alter the mechanical properties of the steel when subsequently tempered at a relatively high temperature, 1000 deg. Fahr.

In normalizing steel containing 0.27 per cent carbon, 0.9 chromium and 0.5 molybdenum a low limit of proportionality and impact resistance are obtained when using temperatures between about 1450 to 1550 deg. Fahr.

The fact that no material changes in tensile or impact properties are produced by oil quenching the chromium-molybdenum steel from a wide range of temperatures when subsequently tempered at 1000 deg. Fahr. has been confirmed. To produce high impact values in the hardened steel, a tempering temperature in the neighborhood of 1200 deg. Fahr. is required.

Production of Heavy Truck Banjo-Type Rear Axle Forgings

Working to close tolerances on an exceptionally large forging necessitates unusually large tools and careful heat treating methods. This article describes the machining and heat treating operations employed in making one of the largest drop forgings used in automotive production. Rough forging removes one hundred and fifteen pounds of stock

By Herbert Chase

WHAT is believed to be the largest drop-forging used in regular production in the automotive industry is the banjo-type rear axle produced in the Allentown plant of the International Motor Co. and used in the Mack Model AB dual reduction truck. It is a drop forging of chrome-nickel steel, 71½ in. long and 16⅜ in. wide at the center of the banjo, and weighs in the rough about 300 lb.

Machining Operations

The machining of so large a forging to close limits presents some interesting problems. The forging is heat treated between certain of the machining operations. To straighten it after this treatment requires a 150-ton hydraulic press. Some of the tools used are larger than are ordinarily employed in automotive work. When finished the axle weighs about 185 lb. but is quite light for an axle suited for use in a 2½-ton truck, and is unusually strong because of the high-grade material used. In the accompanying drawing will be found the dimensions of both the rough and the finished forging, together with the tolerances allowed in machining.

The drop forging concerns who furnish the rough forging are given an option of two materials having identical physical properties. The chemical properties of the two materials are:

Alloying Ingredients	Chrome Nickel Steel	3½% Nickel Steel
Carbon	0.45 per cent	0.45 per cent
Manganese	0.60 per cent	0.60 per cent
Nickel	2.00 per cent	3.50 per cent
Chromium	0.75 per cent	.....

The physical properties of both materials are:

Tensile strength	130,000 lb. per sq. in.
Elastic limit	110,000 lb. per sq. in.
Elongation	17 per cent
Reduction of area	45 per cent
Brinell hardness	280 maximum
Forging heat	2,200 deg. Fahr.

The forging is furnished annealed by the vendor, and must have a maximum Brinell hardness of 280.

In the first machining operation both ends of the forging are cut off simultaneously by hacksaws set in position to give the desired length. This is not a rapid operation but is in step with other operations. The disks cut off by this means are used for test specimens to check analysis and hardness of the steel.

In the second operation the piece is laid in V-blocks and is gaged roughly to determine whether the metal of the forging is so disposed as to be properly cleaned up in the machining operations. This involves checking the angle between the plane of the banjo and the plane of the spring seat. While the piece is in this position centers are drilled in each end.

The third machining operation consists in rough turning the outside ends of the tubular portion (now solid). The piece is mounted on lathe centers but is held rigid by the use of a heavy conical casting, the large end of which is bolted to the face plate of the lathe, and the center to the banjo of the axle. When one end has been turned, the piece is reversed and the same operation repeated on the other end. Between this and most of the succeeding operations, the forgings are handled by overhead air hoists on trolleys or cranes.

The fourth operation is accomplished on a Bullard Maxi-Mill (Fig. 1). This vertical boring machine is a 61-in. special type provided with a table about 7 ft. in diameter, a portion of the vertical guides on this machine having been cut away to permit the use of a table large enough to accommodate the full-length axle. In this operation the bore of the banjo and the banjo faces are rough turned, 1/16 in. (⅛ in. diameter) is left for the later finishing operations.

A battery of four Lodge and Shipley 22-in. lathes with long bed, especially rigged for deep drilling, are used for the fifth operation. The work is clamped in a special chuck fixture (See Fig. 2) at one end while the outer end is supported in a steady rest. As the work turns a gun drill, made especially for the purpose and held stationary in a support rest, is fed into the axis of the work with a feed of 9/16 in. per minute. The drill bar or shank is provided with two countersunk brass tubes which terminate in holes drilled in the cutter. Lard oil under 200 lb. pressure is led through these to the cutting edge, and is instrumental in forcing the chips out of the hole. The hole is finished in one operation to 2-1/32 in. dia. The hole is nearly 24 in. long.

Heat Treatment Principally on Ends

Following this operation, the forgings are taken to the heat-treating room and given a heat treatment, the purpose of which is to remove internal stresses and bring the spindles and outer threaded ends to the required hardness. This treatment is principally on the ends, but is said to improve the structure of the banjo portion to some extent. Each end is raised to a temperature of 1500 deg. F. in a special twin type oil-burning furnace and then quenched in oil. In this quench the axle is suspended vertically to lessen the tendency to warp and distort. This method is commonly employed in heat-treating large guns.

Various Milling Operations

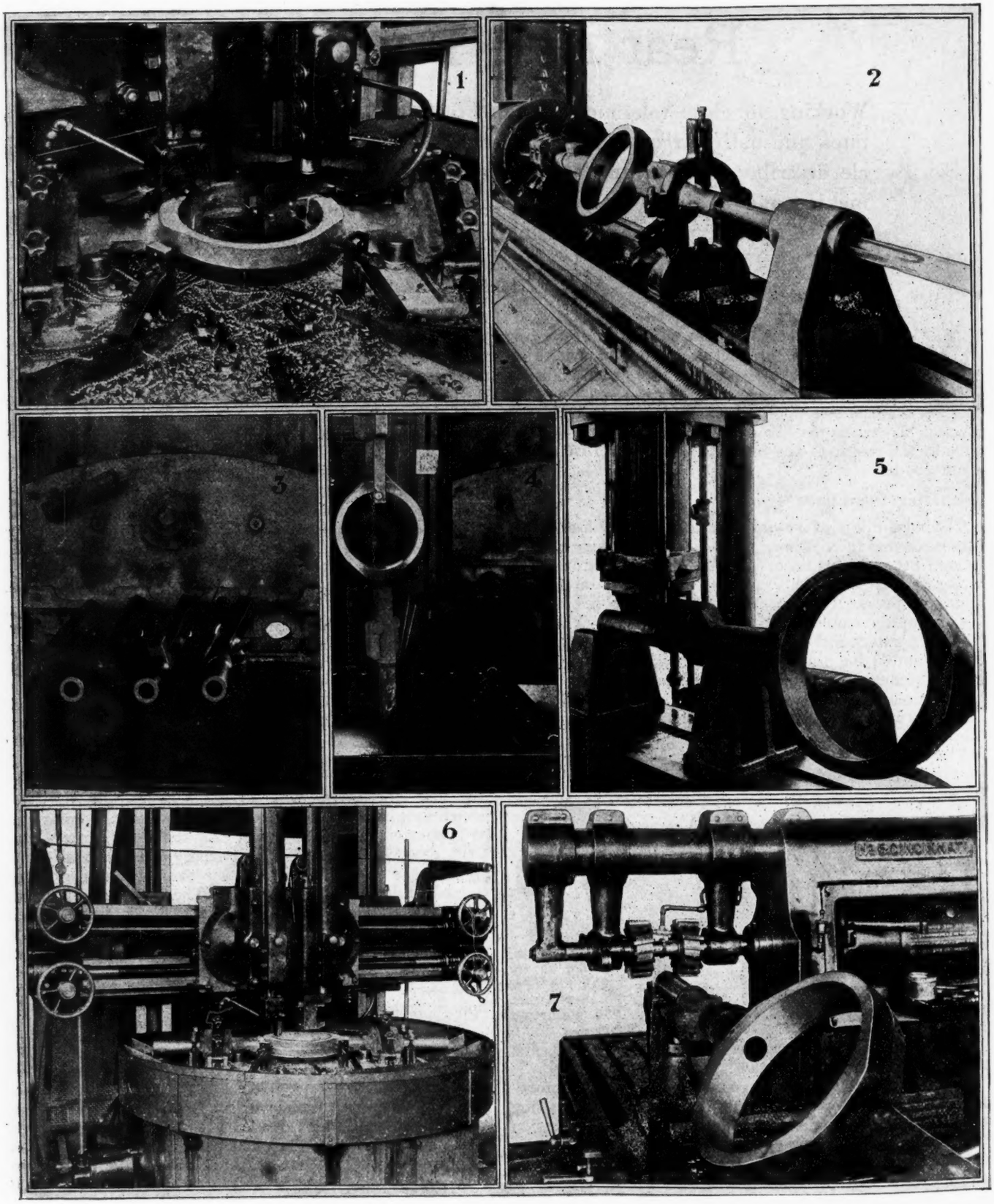
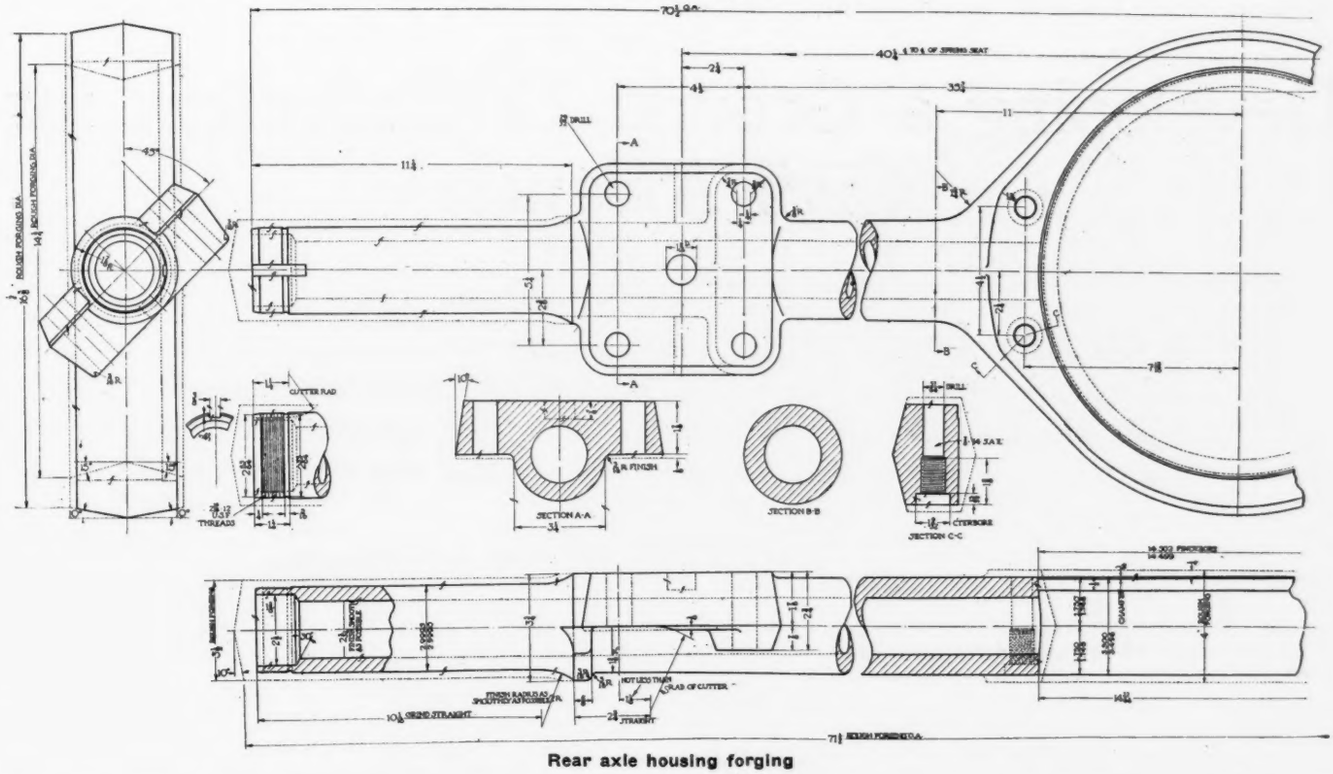


Fig. 1—This Bullard Max-I-Mill effects the rough turning process. Fig. 2—A special chuck fixture clamps the work for drilling. Fig. 3—Internal stresses in the axles are brought out by this heat treatment. Fig. 4—Another view of the heating process. Fig. 5—A 150-ton hydraulic press straightens the axles. Fig. 6—The Max-I-Mill is again shown as it is used in other operations. Fig. 7—Milling the bottom of the spring pad



Rear axle housing forging

After quenching one end the other end is placed in the furnace and the same treatment given it. When both ends have received this initial treatment, they are in turn re-heated to 1150 deg. F., to temper.

A view of the axles undergoing heat treatment is shown in Figs. 3 and 4. After heat treatment, the axles are tested for hardness which is held between 260 and 290 Brinell. They are then placed in V-blocks under a 150-ton hydraulic press, shown in Fig. 5, where they are straightened until a test bar, 0.010 in. smaller than hole, can be passed through bore from end to end of axle.

The forgings are then returned to the machine shop where they undergo the sixth machining operation accomplished on a standard American 24-in. lathe with 16-ft. bed. This operation consists of counterboring the axle ends to 2½ in. diameter and a depth of 1⅜ in., and threading the ends on the outside to receive the locking collar. The tail stock of the lathe is used to carry a cutter which counterbores and faces the axle end in one operation. The outside turning and threading are accomplished by four tools carried in a special turret made up for the purpose.

The seventh machining operation consists in turning the outside of the axle spindle and the radius at its inner end. This spindle fits the inner race of the Timken bearings and is held within limits of 2.9995 and 2.9990 in. Prior to this operation, which is accomplished on a LeBlond heavy lathe, the axle is provided with special expanding centers which fit into the counterbore at each end, and is stiffened by heavy steel bars bolted to each side across the faces of the banjo.

The work is returned to the Max-i-Mill, for the eighth machining operation shown in Fig. 6. It is carefully located in the fixture shown after which the following operations are performed simultaneously or in sequence.

1. Turn finishing cut on inside diameter of banjo.

2. Face both sides of banjo in fixed relation to the finishing cut on the spindle.

3. Counterbore banjo to receive carrier flange. This counterbore is held within the limits, 14.502, and 14.499, and is checked by snap and pin gages.

4. Chamfer entering edge of carrier counterbore.

The ninth machine operation is accomplished on a No. 5 Cincinnati milling machine. This consists in milling the bottom of the spring pad in fixed angular relation to the finished faces of the banjo. (See Fig. 7.) In this operation the work is held in V-blocks with pin contacts, and the face of the banjo is held in contact with a pin so located as to give the desired angular position. When the bottom of one spring pad has been machined, the piece is reversed for machining the other pad.

The tenth operation consists in milling the keyway through the threaded portion at each end of the axle. This operation is also accomplished on a No. 5 Cincinnati milling machine.

The eleventh operation consists in drilling the spring pads, using a special jig and supporting fixture.

The twelfth operation consists in drilling, counterboring and tapping four holes in banjo for shouldered through studs to fasten carrier.

The final operation consists in trimming the external surface of the axle by use of a portable emery wheel, and hand cleaning to remove burrs, etc. Following this, the finished piece is carefully checked by special gages, as to bore of banjo, alignment of bore through spindles, diameter of spindles, and angular relation between the faces of spring seats and faces of banjo. The distance between the axis of the piece and the faces of the banjo and spring pads is also checked.

From the dimensions given on the drawing, it will be seen that the tolerances maintained are unusually close for so large a piece.

A FURTHER step in the movement toward the standardization of automobile, motorcycle and cycle parts has been taken by the British Engineering Standards Association in the formation of seven sub-committees to undertake the following sections of the work: Nomenclature, steels, small fittings, electrical fittings, shafts and shaft details; wheels, rims and tires, and cast iron. Technical data in regard to the specific subjects to be taken in hand immediately are being collected.

Developing a Ground Organization for Civil Aviation

Part II

In this final article, Mr. Bradley points out that the success of commercial aviation in France rests entirely upon the system of government subsidies which has been established. He discusses these and brings out points vital to a consideration of development in the United States.

By W. F. Bradley

ALL the commercial aviation lines operating in France at the present time have been created and are maintained in operation by reason of a system of Government subsidies granted to the aerial navigation companies. Half the purchase price of approved types of machines is paid by the State on condition that the owners maintain them constantly in flying condition and fill all the clauses of a well-defined contract.

In addition to the purchase subsidy, public service lines receive special subsidies based on hours of flight and on commercial efficiency. Until recently the subsidies were granted whenever a flight was made under the stipulated conditions, without any consideration of the useful load carried, and were thus an encouragement to fly in ballast. Such an arrangement could only be temporary, but it had its value, for it assured the regularity of trips from point to point even when there were no passengers or freight to be carried, and proved to the public that the airplane could be relied on for regular service.

At the present time the commercial subsidy is only granted when passengers or freight are carried, and when the journey is completely accomplished. If a plane sets out for a given point and has to abandon the trip a few miles from the end, the subsidy for that flight is lost. Also if an average speed of 80 miles an hour is not maintained, no subsidy is paid. When weather conditions are very unfavorable, the subsidy can be granted, on the recommendation of the competent authorities, if the flight shows a gain of 25 per cent on the fastest public service by train or steamer. The chief of the State aerodrome decides whether weather conditions are or are not suitable, and should his decision be in favor of a start and the plane does not leave, the subsidy is lost. Also, if there is a delay at the start, after weather conditions have been pronounced satisfactory, the subsidy is reduced 5 per cent for each quarter hour, or fraction thereof.

Commercial Subsidies

The French commercial subsidy is 75 centimes a kilometer per passenger, and .005 centimes per kilo of freight carried at a scale of charges approved by the State. Fares are fixed at 80 centimes per kilometer per passenger, while the freight charges must be .015 centimes per kilogram-kilometer. Under this scale of charges the cost of an aerial trip from Paris to London, or Paris to Amsterdam, is 300 francs, or considered at nominal exchange 26 cents a mile. If the present actual value of the dollar is taken into consideration, a long-distance flight in Europe costs slightly less than 10 cents a mile. The rates now in operation are practically the same as first class fares on the railroad and steamship routes. There is no difference at all if the fact is taken into consideration that the aerial navigation companies pick the traveler up at his hotel in Paris and land him at the door of his hotel in London for the inclusive charge of 300 francs. By the more old-fashioned method of travel taxicab fares have to be paid at each end of the journey, and a certain amount has to be given away in tips at the railroad station and when changing from train to steamer and vice-versa.

Regularity Encouraged

By reason of the high subsidies offered by the French Government, British firms operating on the London-Paris line have been seriously affected, and for a time all of them abandoned. More recently the Handley-Page Co. has resumed operations, but they undoubtedly are working at a loss in competition with the French. Although they have the advantage of a high subsidy, French firms declare that they are making little money, but there is no doubt that the regularity and the reliability of the airplane having been proved the public will travel by air in far greater numbers, now that the cost is practically the same as by the railroad.

It is recognized that regularity of operation must be encouraged by all possible means, and because of this an additional subsidy is granted when the proportion of trips successfully accomplished is high, and deductions are made when the percentage is low. Regularity is determined by the relation between the number of trips for which the subsidy is paid and the number on the program, the coefficient of variation being equal to the resultant expressed in hundreds, increased by 30 hundredths for the month of December and by 20 hundredths for the other months. As examples, if the regularity is 80 to 100, the coefficient becomes 100-100 = 1, and there is no change in the subsidy. With a regularity of 90-100 the coefficient is 110-100, giving an increase of one-tenth in the subsidy. With a regularity of 60-100, the coefficient is 80-100, corresponding to a reduction of 2/10 in the subsidy paid.

In addition to this trip or commercial subsidy of 75 centimes a kilometer per passenger, there is an additional hourly subsidy made up of the four elements, as follows: Amortissement subsidy, crew subsidy, transport subsidy, and gasoline subsidy. For the amortissement the life of a plane is calculated at 200 hours' actual flight, and the price of the machine having been fixed by contract,

the formula becomes:

$$\frac{P \div 1.5}{200}$$

As half the cost of the plane has been paid by the State at the time of purchase, the amortissement subsidy paid by the Government is half the amount found by the above formula.

The crew subsidy is found by the formula

$$0.10\ E\ m \div \frac{n\ HP}{2} \text{ francs,}$$

in which $E\ m$ is the length of the average flight, or when a flight is made in several stages the total distance divided by the number of stages.

The transport subsidy is found by the formula:

$$\frac{K}{1000} V^2\ T$$

in which V is the official speed in kilometers of the plane at an altitude of 6500 ft., T the tonnage of the plane after deduction of the weight of the crew, navigating instruments, weight of fuel necessary to maintain a ceiling of 13,000 ft. after one hour's flight, and to cover a distance of 300 miles with a head wind of 10 meters per second. K is a coefficient which varies from 11 for regular journeys of 125 miles to 19 for trips of 620 miles.

The gasoline subsidy is determined for fixed cylinder engines by the formula:

$$n\ HP \times \frac{0.250}{0.65} \times \frac{p}{2}$$

in which $n\ HP$ equals the number of horsepower, and p the price of gasoline in liters, this price being determined at the beginning of every quarter. For rotary engines the formula is:

$$n\ HP \times \frac{0.320}{0.65} \times \frac{p}{2}$$

The object of the subsidy system being the development of French aviation, all foreign elements are eliminated. The president and at least two-thirds of the directors of the subsidized company must be of French nationality; all the planes and engines must be of French design and construction, and the pilots and mechanicians must be French citizens, and possess French Government licenses.

Material Control

A rigorous control is maintained over all the material. No plane can go into service unless it has been approved by the Technical Department of the Air Service; it must constantly be maintained in good flying condition, and after 200 hours' flight it must either be scrapped or entirely rebuilt. A certain amount of discretion is displayed in the application of this latter rule, for a plane may have been maintained in such excellent condition that its life is far from ended after 200 hours in the air. The subsidy, however, for that machine is never continued unless the Technical Department has pronounced favorably on its condition after overhauling, and every three months, or every 50 hours of flight after the first 200 it must be submitted for thorough technical examination.

For engines the normal life is estimated at 100 hours' operation, but here again it is possible for the maintenance to have been undertaken in such a thorough manner that at the end of the hundred hours few of the original parts are left and the engine is in as good a condition as when it went into service. Every month detail reports showing the state of planes and engines, and indicating the work done on them, have to be submitted to the Aerial Navigation Service. Similar reports have to be supplied concerning the flying and mechanical staffs.

Aerial navigation companies must maintain a minimum of one pilot for three planes and at least one mechanician per 300 hp. For any given line the minimum number of planes which must be maintained by the operating company is determined by dividing the total number of hours of flight figuring on the program for the year by 200 and multiplying by 2. The average commercial speed must not be less than 80 miles an hour. Number of planes =

$$\frac{2 \times \text{daily flights in hours} \times \text{number of days' service}}{200}$$

For a service such as that from Paris to London, the program of which may call for operation 300 days in the year, a minimum of nine planes would have to be maintained by the subsidized company. The general rule regarding the frequence of trips is that a daily service must be maintained when the distance covered is less than 150 miles from the French frontier, and at least three times a week for Northern African and other international lines running at least 150 miles from the French frontier.

Penalties

While the entire system under which subsidies are granted tends toward regularity of operation, the State imposes penalties when regularity is not kept up to a certain standard. Thus if for any cause the irregularity falls for two consecutive months below 40 per cent during December to March, and below 50 per cent for any other months of the year, the subsidies are suspended until the regularity has risen to more than 40 per cent in the first case and more than 50 per cent in the second case. A period of two months is allowed to re-establish the service on this basis, and if the improvement is not made within this time the subsidy is permanently withdrawn.

The main subsidy is now granted on the number of passengers, or the quantity of freight carried, and not on trips made light or in ballast. But in addition to this the subsidy is suspended if during three consecutive months the number of paying passengers or the quantity of paid freight is less than 30 per cent of the capacity of the planes in service. The subsidy is not given again until the commercial efficiency has risen to at least 30 per cent of capacity.

The end of the war found France with an immense number of aviation grounds, few of which were suitable for commercial services. For military operations the grounds had to be immediately in the rear of the armies, and were therefore most plentiful in the north and the east. There were no aviation routes, as they are understood now, for all flights were from the rear of the Allied armies to the German front line or to points in Germany.

As a consequence, France derived little material benefit from the aerodromes bequeathed to her during the war, and in the great majority of cases these grounds have been given back to their original owners. There are a few exceptions, such as the American Air Service reception and dispatching ground at Orly, near Paris, which has been taken over by the Aerial Navigation Service and is being equipped as an airship port. Commercial value can only be derived from landing grounds when they are placed on an important line of flight. While local authorities should be encouraged to help in the development of aviation ground organization, and can assist considerably by the gift of land in the neighborhood of important centers, there is not much to be gained by mere groups of grounds.

At the present time France possesses about thirty State owned and controlled aviation grounds, and about twenty privately owned aerodromes. These figures, however, are not any real indication of the value of the grounds to commercial aviation, for a string of equally spaced landing

grounds between Paris and London, or between Paris and Brussels, can be of infinitely greater value than a big grouping of grounds around Bordeaux or near the Spanish frontier.

Last year the total distance covered by public service planes operating under the control of the French Aerial Navigation Service was 1,203,565 miles. This figure comprises flights with passengers or merchandise accomplished according to schedule. No military flights, demonstration trips, tests, or private journeys are included.

Passenger Service

The greatest volume of traffic was, and still is, between Paris and London, over a country which is most unfavorable for flying, for it is adversely affected by fog, and comprises the crossing of the English Channel. The effect of fog is shown by a comparison of the number of trips made between England and France during the winters of 1919-1920 and 1920-1921. The past winter was exceptionally mild, with an almost entire absence of violent storms, but as a considerable amount of fog prevailed, the regularity of the service was much more affected than during the wild and severe winter of 1919-1920. There is no doubt that given the ground and general organization existing on the Paris-London line very much better results would be obtainable in the United States by reason of the more favorable climatic conditions.

To develop a passenger-carrying service, freedom from accident is essential, with regularity as an important but secondary consideration. For a freight service regularity is of primary importance.

The degree to which these two requirements have been obtained is shown by the official returns for the public service lines under the control of the French Aerial Navigation Service. For the years 1919 and 1920, when the mileage covered by public service planes was 1,203,565, with a total of 6697 passengers, the number of fatal accidents was fourteen, or one person killed per 85,973 miles flown. Merely as a matter of comparison it can be noted that for a period of twelve months, including a portion of the time mentioned above, the distance covered was 1,148,188 miles and 15,697 passengers carried with fifteen deaths, giving one person killed for a distance of 76,545 miles. During this latter period passenger traffic has increased enormously, and although the number of accidents per mile is higher, the proportion of passengers killed is much lower.

In arriving at the figure of one person killed for every 85,973 miles flown, it should be noted that no advantage has been taken of such trips as the trans-Atlantic flights, the Farman flight from Paris to Northern Africa, and large numbers of other European sporting and demonstration events, all of which were accomplished without a fatal accident. These figures are important, for they are the first of their kind covering aviation on a commercial basis. Insurance companies up to the present have shown very little confidence in aviation, and have always insisted on very high premiums being paid. Undoubtedly this is owing to the fact that all the figures they have obtained on aviation accidents have dealt with, or comprised, military and demonstration or stunt flying, which are entirely foreign to commercial aviation.

Freight Carrying

The increase in the amount of freight carried on the Paris-London line is remarkable, the figures jumping from 31,040 pounds in 1919 to 271,720 pounds in 1920. The great proportion of this was from Paris to London, only a comparatively small amount coming from England to France. There are two reasons for this. Paris manufactures quantities of high-grade and costly articles which can bear the increased cost of transportation by airplane. As examples, dresses, hats, jewelry, fancy goods, and small automobile parts are shipped regularly by airplane from Paris to London, but there is comparatively little traffic of these goods in the opposite direction.

Another reason for the heavier traffic Londonward is the better publicity carried out in France. Instead of merely advertising the airplane service in a general way, as is done in England, the commercial departments of the French aerial navigation companies circularized all the big stores, all the high-class milliners, dressmakers and jewelers, and in many cases paid personal visits and pointed out the great advantages to be derived from shipping goods by airplane instead of by train and steamer. The dispatching departments were induced to make a trial, and in nearly every case it soon became common practice to prefer the airplane for urgent deliveries. In the matter of mail, the bulk of the traffic is from London to Paris, but this is owing to the fact that the rates are much lower from London than in the opposite direction.

In addition to the commercial lines from Paris to the north and northeast, there is another important line, of an entirely different nature, from Toulouse in the south of France to Casablanca in Northern Africa. Here the amount of traffic is light, but the ordinary means of locomotion are so defective that the airplane has really no competition from train and steamer. The distance from Toulouse to Casablanca is 1150 miles, and by airplane can be covered in 13 hours' flight, or in two days' elapsed time, for the journey is made in four stages and there is no night flying. This compares with seven to eight days by the fastest boat and train service. This route, unlike those in Northern France, is entirely free from fog, and is not often affected by storms.

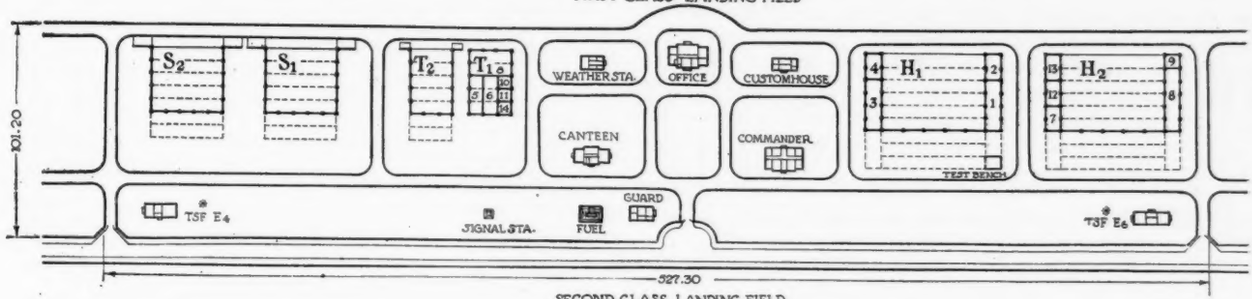
An Important Line

It covers only a slight distance over French territory, has been established by the Latecoere Co. and is operated entirely by them, under the French subsidy system, but without the use of French Government landing grounds. French military grounds are used in Africa. The line of flight follows the Spanish coast to Gibraltar, then cuts across the Mediterranean to Tangiers, and follows the northern African coast as far as Casablanca. As the French Aerial Navigation Service cannot establish landing grounds outside its own territory, this work has been taken up by the Latecoere Co., and emergency grounds have been laid out at intervals of 60 miles along the entire route. The journey is made in four stages: Toulouse to Barcelona, Barcelona to Alicante, Alicante to Malaga, and Malaga to Casablanca, the average length of the stages being a little less than 300 miles. By following the coast line for the entire distance all difficulties regarding the route are avoided, and there is also the advantage that in addition to the 60-mile emergency landing grounds the pilots can bring their machines down on the sea shore in case of absolute necessity. These landings, of course, are not recommended, for it is difficult to get away again from the sand, but their possibility offers a guarantee against serious accidents. Because of these specially favorable conditions, compared with the more northerly lines, the Latecoere Co. was able during a whole year to maintain a regularity of 97 per cent. Only 3 per cent of the trips were not accomplished or were not finished within the time limit necessary to get the Government trip subsidy.

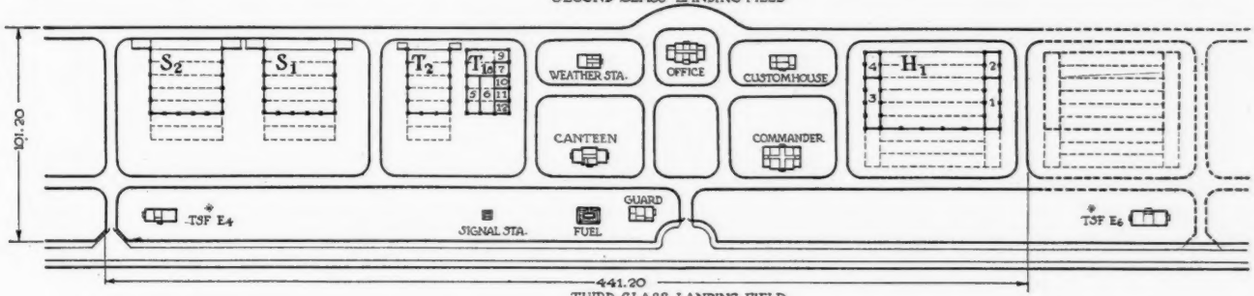
Machines used on this route are the Breguet 14 A2 and the Salmson Corps d'Armée type, the former being fitted with the Renault engine and the latter with the Salmson star-type water-cooled engine. These machines have been modified for commercial purposes and carry two passengers, mails and freight, with a fuel supply for four hours' flying.

For this 1150-mile route, with three departures in

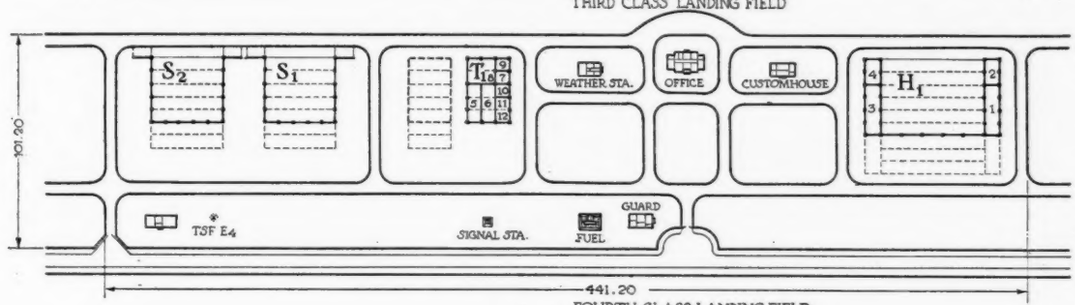
FIRST CLASS LANDING FIELD



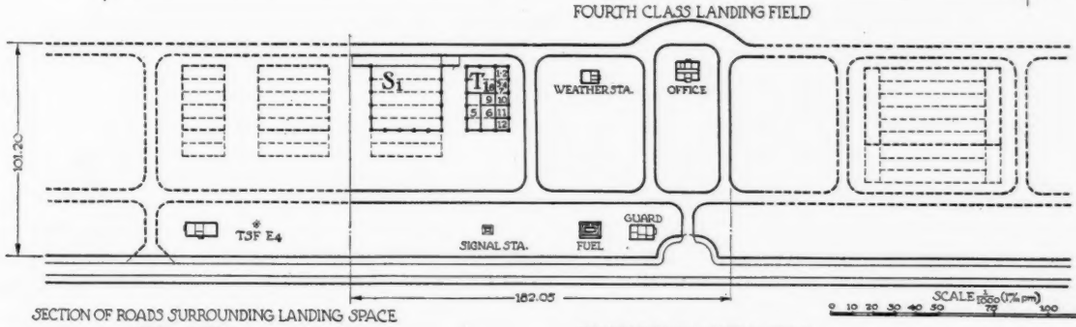
SECOND CLASS LANDING FIELD



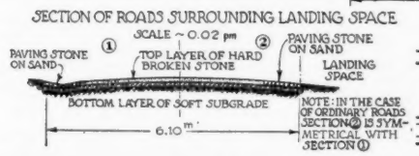
THIRD CLASS LANDING FIELD



FOURTH CLASS LANDING FIELD



SECTION OF ROADS SURROUNDING LANDING SPACE


SCALE ~ 0.02 pm
①
②
PAVING STONE ON SAND
TOP LAYER OF HARD BROKEN STONE
PAVING STONE ON SAND
LANDING SPACE
BOTTOM LAYER OF SOFT SUBGRADE
6.10 m
NOTE: IN THE CASE OF ORDINARY ROADS SECTION ② IS SYMMETRICAL WITH SECTION ①

EMERGENCY LANDING FIELD

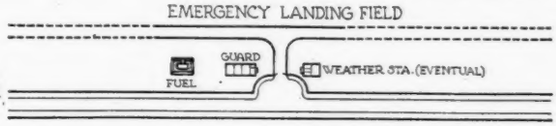


	Diagram	Intended Use	Provisional	Definite
FIRST CLASS	1	Machine shop	T¹ 6x7	H¹ 24x7.5
	2	Stockroom for same	T¹ 6x7	H¹ 12x7.5
	3	Woodworking shop	T¹ 6x7	H¹ 24x7.5
	4	Stockroom for same	T¹ 6x7	H¹ 12x7.5
	5	Electric shop	T¹ 18x7	T¹ 18x7
	6	Stockroom for same	T¹ 12x7	T¹ 18x7
	7	Tinshop and forge	T¹ *	H² 12x7.5
	8	Automobile garage	T¹ 12x14	T¹ 12x20 H² 30x7.5
	9	Stockroom for same	T¹ 6x7	H² 6x7.5
	10	Weather station stockroom	T¹ 6x7	T¹ 6x7
	11	Emergency station	T¹ 6x7	T¹ 6x7
	12	Fire station	T¹ 6x7	H² 12x7.5
	13	Mechanics' lodgings	.....	H² 12x7.5
	14	Unassigned	T¹ 6x7	.....
SECOND CLASS	1	Machine shop	T¹ 6x7	H¹ 24x7.5
	2	Stockroom for same	T¹ 6x7	H¹ 12x7.5
	3	Woodworking shop	T¹ 6x7	H¹ 24x7.5
	4	Stockroom for same	T¹ 6x7	H¹ 12x7.5
	5	Electric shop	T¹ 18x7	T¹ 18x7
	6	Stockroom for same	T¹ 12x7	T¹ 18x7
	7	Tinshop and forge	T¹ *	T¹ 6x7
	8	Automobile garage	T¹ 12x14	T¹ 12x14
	9	Stockroom for same	T¹ 6x7	T¹ 6x7
	10	Weather station stockroom	T¹ 6x7	T¹ 6x7
	11	Emergency station	T¹ 6x7	T¹ 6x7
	12	Fire station	T¹ 6x7	T¹ 6x7

	Diagram	Intended Use	Provisional	Definite
THIRD CLASS	1	Machine shop	T¹ 6x7	H¹ 24x7.5
	2	Stockroom for same	T¹ 6x7	H¹ 12x7.5
	3	Woodworking shop	T¹ 6x7	H¹ 24x7.5
	4	Stockroom for same	T¹ 6x7	H¹ 12x7.5
	5	Electric shop	T¹ 18x7	H¹ 17x7
	6	Stockroom for same	T¹ 12x7	H¹ 18x7
	7	Tinshop and forge	T¹ *	T¹ 6x7
	8	Automobile garage	T¹ 12x14	T¹ 12x14
	9	Stockroom for same	T¹ 6x7	T¹ 6x7
	10	Weather station stockroom	T¹ 6x7	T¹ 6x7
	11	Emergency station	T¹ 6x7	T¹ 6x7
	12	Fire station	T¹ 6x7	T¹ 6x7
FOURTH CLASS	1	Machine shop	T¹ 6x7	T¹ 6x7
	2	Stockroom for same	T¹ 6x7	T¹ 6x7
	3	Woodworking shop	T¹ 6x7	T¹ 6x7
	4	Stockroom for same	T¹ 6x7	T¹ 6x7
	5	Electric shop	T¹ 18x7	T¹ 18x7
	6	Stockroom for same	T¹ 12x7	T¹ 12x7
	7	Tinshop and forge	T¹ *	.....
	8	Automobile garage	T¹ 12x14	T¹ 12x14
	9	Stockroom for same	T¹ 6x7	T¹ 6x7
	10	Weather station stockroom	T¹ 6x7	T¹ 6x7
	11	Emergency station	T¹ 6x7	T¹ 6x7
	12	Fire station	T¹ 6x7	T¹ 6x7

* Located in machine shop. The location and the size of buildings TSF (Stations E_4 and E_6) vary with the field. Useful information can be obtained from the Communication Dep. The size of the weather station varies with the field; information can be obtained from the Weather Bureau.

either direction every week, the company has to maintain a fleet of eighty planes in order to assure a regular service. At least ten planes are always kept in reserve at the three intermediate stations between Toulouse and Casablanca in order to assure a regular service in case of mechanical failure or breakdown. Established on Sept. 1, 1919, this company had flown 435,000 miles by the end of February, 1921, and carried 12,000 passengers.

Results of Commercial Aviation in France

PUBLIC SERVICE LINES ONLY—YEARS 1919-1920

Lines		No. of Complete Trips	Miles Flown	Paying Passengers	Freight, Lb.	Mail, Lb.
International Lines:						
Paris-London	1919	365	88,190	683	18,408	160
Paris-London	1920	2,578	616,332	5,359	239,589	5,118
Paris-Brussels (via Lille)	1919	473	59,126	27	9,296	470
Paris-Brussels (direct)	1920	387	68,953	302	3,832	496
Bayonne-Bilbao	1919	60	2,050	0	0	0
Bayonne-Bilbao	1920	139	13,866	36	0	0
Local and Colonial Lines:						
Toulouse-Casablanca (Africa)	1919	241	66,889	3	1,494	395
Toulouse-Casablanca (Africa)	1920	885	227,422	126	21,825	7,539
Paris-Cabourg (Season traffic only)	1919	34	3,780	16	1,840	0
Paris-Cabourg (Season traffic only)	1920	63	7,391	41	1,944	0
Total traffic 1919		1,173	220,035	729	31,040	1,025
Total traffic 1920 (including new lines)		4,428	983,530	5,968	271,720	13,306
		5,601	1,203,565	6,697	302,760	14,331

For 1,203,565 miles of flight 14 persons killed, being one death per 85,973 miles flown.

Customs import duties at Le Bourget (Paris) Air Port:
1919.....15,000 francs 1920.....310,000 francs

A Method of Preventing Interference in Worm Gearing*

A GREAT many manufacturers mill hobs on Pratt & Whitney or Lees-Bradner thread millers, which do not produce a straight sided thread, the curve varying with both the helix angle and the diameter of the milling cutters. If this hob is relieved by any method that leaves the curve on the side of the thread as it was milled; if you proceed to hob gears with it, and your customer then cuts the mating worms with a single point tool in a lathe when the worm gears are installed they are going to give trouble, and complaints will come in that the sets heat up and cut and are noisy, simply because the teeth in the gear and worm do not conform.

To verify the truth of this statement, hob a worm gear with the curve on the side of the tooth of the hob, and mesh it with a worm produced with a single point tooth on a lathe, mounting this pair in any fixture that will give the correct centers. You will find them to be noisy and to give poor tooth contact. To determine just how much it takes to correct them, take this same worm and let a man who can score the sides of the teeth in file form, put the worm back and run it into the worm gear, and it will surprise you to see the amount of iron dust that will pile up under this worm and gear on the table of your testing machine.

Some manufacturers claim to get fairly good results from a fly tool used on machines geared up to pass a fly tool through the periphery of the teeth, but I am frank to say that we have never gotten a worm gear from this method that was not a series of very pronounced flats. This leads me up to observations made in a number of experiments and tests which were more or less contrary to standard practice. The latter in my estimation does not give as good results as I have obtained by making the pitch diameter equal to 0.99, its correct theoretical value, or by cutting one tooth more in about 50.

In a worm and gear, of which the gear blank is cut with one more tooth in 50, there would be interference at the corner of the worm tooth from the pitch line down to the root of the tooth if it were not that the hob had removed or under-cut the tooth. Part of this interference is caused by the worm or hob being of greater linear pitch than the worm gear, but on the adjacent tooth this interference would have been less, and on the third tooth there would have been very little interference. This cut away or under-cut from the pitch line down is what is wanted, as it keeps the mating worm and gear from rubbing at this point when the worm and gear are first meshed, with the result that the bearing or contact of the worm is of double involute shape from the center of the gear outward. That is, the contact is thrown down to the bottom of the worm tooth, which is the most efficient point of contact as regards rubbing or frictional loss.

In addition to this central contact a contact is obtained at the very points of the teeth, which soon wear into involute shape. This contact is obtained in a few minutes of running without abrasive material.

With the slight amount of metal removed below the pitch line by the under-cutting process just spoken of, the surfaces are so close together that it is only a short time until perfect contact is obtained on the whole tooth, whereas in a worm gear with a theoretically correct pitch diameter, excessive pressure occurs below the pitch line in the center of the gear and at the two points of the tooth.

This being so radical a departure from former practice and theories I would have been loath to go into this explanation had it not been for the fact that all our customers who gave the method a fair trial obtained better results than with the old method. This method was first brought to my attention through a gentleman by the name of Voltaire. We made quite a number of tests and have as a result adopted this method in all of our own worms and gears that we market for sale in sets.

From a paper read by John B. Foote before the American Gear Manufacturers' Association at their Cincinnati meeting.

Economic Aspects of Great Lakes-St. Lawrence Ship Channel

THE proximity to the Great Lakes of a great part of the automotive industry has made the Great Lakes-St. Lawrence Ship Channel of special interest to such manufacturers. High freight rates and freight congestion during peak production times are other factors which have led automotive manufacturers to scrutinize carefully the various phases of this much-discussed waterway project.

The economic aspects of the Great Lakes-St. Lawrence Ship Channel are discussed in a practical and interesting way by Roy S. MacElwee and Alfred H. Ritter in a volume recently published by the Ronald Press Co. The book is entitled "Great Lakes-St. Lawrence Ship Channel," and comprises a detailed study of the present transportation situation, especially as related to this proposed waterway. The book is a result of a careful and practical survey of the entire situation made by the authors and takes up such matters as the cost of transportation between upper lake ports and Liverpool, production in the territory tributary to the Channel, comparison of navigation facilities on the Great Lakes with those of ocean ports, the problem of return loads, the volume of commerce affected by the Channel, etc.

The Motor Bus Field as a Market for Trucks

There is undoubtedly a large field for the development of the motor bus in the United States. How far this method of transportation can be developed and the means to hasten its growth can be determined only after careful analysis. This article is of interest because it gives the opinion of one man who has visualized the possibilities of the field.

IN discussing potential truck markets, there is a necessity for visualizing the possibilities of motor bus development in this country. After this general picture has been obtained, a careful study of the more detailed phases of the market, together with constructive help in the development of motor bus travel, will aid materially in selling trucks to this field.

Certain fundamentals underlie the development of the bus market. These relate to the type of chassis construction, the adaptability of the truck unit to the special type of transportation for which it is to be used, and other similar factors. A few companies have studied these problems carefully, but they are still far from being fully solved. Truck manufacturers may well profit by more extensive research into the engineering and merchandising problems involved in the motor bus field, as the possible growth of such transportation is not yet conceived in many quarters.

Because of the importance of this potential market for the truck, the remarks recently made by a prominent truck axle manufacturer are of special interest at this time. Ezra W. Clark, at the recent M.A.M.A. credit convention, outlined briefly some of the problems underlying the motor bus problem and indicated the certain lines of probable development. While some of the conclusions drawn may be a trifle too optimistic as regards the immediate future, the general trend is undoubtedly along the lines indicated. Before the market can be developed to a high degree, however, considerable sales effort and analysis will be necessary. Mr. Clark said in part:

Special Bus Chassis

It was only a few years ago that a very large percentage of the motor trucks in use were, in reality, but converted passenger car chassis. The use of these converted motor trucks soon developed two facts: First—that the world needed motor trucks. Second—that a passenger chassis could not be made to do double duty in the specialized field of freight transportation.

Today a very large percentage of motor buses used in America are built on regular truck chassis. The use of these converted motor buses has developed two facts: First—that America needs motor buses. Second—that converted motor truck chassis cannot be made to do double duty in the specialized field of commercial passenger transportation.

Opportunity and ability constitute duty. America needs motor buses. The motor truck industry of America has the ability to produce motor buses and the fulfillment of this obligation will bring the automotive industry under the approving eyes of the nation. Doing a worth while thing well will establish our industry in the good will of public opinion.

The population of the United States increases approximately 20 per cent every ten years. It has increased from 75,000,000 in 1900 to 105,000,000 in 1920, of which a disproportionate percentage has occurred in the cities. Urban population is increasing at the rate of 34.9 per cent as compared with 11.1 per cent in rural districts. The burden of transporting the immense armies of city workers to and from their homes each day has fallen, in the main, upon the trolley systems of America. New York, Chicago, Boston and Philadelphia have supplemented the trolley with elevated lines and subways. (Chicago's subway designed but not constructed.) Trolley building has almost ceased in America.

The cessation of trolley construction has been due to the increasing costs of construction and the growth of the automobile as a passenger carrying vehicle. This new unit of transportation has supplemented existing transportation systems and by reason of its speed and flexibility, has greatly enlarged the residential sections of all our cities.

"Jitney" Service Usually Unprofitable

Sporadic outbreaks of "jitneys" in various cities, show the possibilities of motorized passenger transportation—these epidemics have also shown the fallacy of trying to operate high-powered, small capacity passenger automobiles at a profit. The public has been educated at the expense of the "jitney" owners and operators.

The growth and development of most cities has radiated from their business sections along fixed lines of transportation so that in many cities "outlying" and "neighborhood" business and recreation centers have grown up with startling rapidity.

An analysis of the transportation facilities of any of our cities, in view of these facts, will show a wonderful opportunity now open to improve the present systems with motor bus lines. These may be operated by and in conjunction with the present trolley systems or by independent companies over routes laid out by city authorities so as to bring the wage earners of the cities into close touch with their places of employment and recreation.

The quickest, most convenient and most comfortable way in which the present transportation systems of our cities can be supplemented and enlarged, is by the development and use of the motor bus. An exhibition of the successful operation of motor bus lines in some of our larger cities indicates that this phase of city life will see a marvelous and stupendous growth in the next few years.

Specialized work requires specialized equipment. The

character of service required should govern the design and construction of motor vehicle used for the commercial transportation of passengers. Eliminating the automobile and taxi-cab, motorized passenger vehicles may be divided into the following four classifications:

Types of Bus

The development of the automobile has made rather startling changes in the systems of rural education. The isolated "little red school house" is being abandoned in favor of larger consolidated schools in the center of rural population. This evolution means larger and better schools with a consequent raising of the standards of instruction. School buses operated by townships and school districts, make regular runs, bringing the children to the central grade schools. Buses for this service are of two types—very light construction for use on dirt and unimproved roads and the heavier type designed for use on improved and hard roads.

Motor Stages—Seating from 12 to 20 passengers, operated by one man, pneumatic tires, speed of 20 to 35 m.p.h., are coming into prominence.

This type of vehicle is suitable for suburban service and passenger traffic between cities. Motor stages of this type—the European "Charabanc"—are now very largely used in California and many of the western railroads are using them as feeders to and from their divisional points.

Single Deck Buses—Seating from 18 to 30 passengers—operated by one man—pneumatic tires or cushion wheels—speed governed by ordinance.

This type of bus can be used to supplement the service of double deck buses during the peak hours in cities where the volume of traffic does not require the use of a heavier type bus; also used as extensions to double deck bus service carrying passengers further out into the suburbs; can be used by public utility companies to supplement present trolley systems and as cross town feeders. At present it is almost impossible to raise money for public utility extensions and improvements, and this type of bus presents an inexpensive method of extending present facilities without the need of expensive track and power house construction. This type of bus can also be used for transfer of passengers between railroad terminals and hotels.

Double Deck Buses—Seating from 40 to 50 passengers, manned by driver and conductor—operating on solid tires or cushion wheels.

This type of motor bus is indicated for service along regular routes preferably on streets not occupied by trolley tracks, covering distances from 4 to 10 miles, along the main arteries of traffic. They can be profitably operated in large cities and in smaller cities where there is a heavy peak load at certain hours of the day.

There are, in addition to the types mentioned, one or two other phases of motor bus construction which may be described as incident to a period of transition. In this class should be placed the trolley bus, operating without tracks on rubber tires, obtaining its power from an overhead trolley. Also, the flanged wheel motor bus, operating economically and efficiently as a passenger vehicle on short line railroads where the traffic does not warrant the use of expensive railroad equipment.

Design Problems

Motor bus operation in many cities has shown that standard truck chassis are not suitable for motor bus construction and service for the following reasons: excessive weight; too much unsprung weight; high center of gravity; rigidity of suspension; unsuitable gear ratios; narrow treads; large turning radius; stiff steering gear; high top clearance; high passenger floor; too short wheel base, causing dangerous overhang. The development of these shortcomings of standard truck construction shows the necessity of special construction for motor buses, covering the following points:

Lightness with strength (insuring minimum gas consumption).
Small unsprung weight.
Low center of gravity.
Flexible control.
Special transmission.
Wide treads (eliminating swaying of bus).
Ample wheel base (to prevent undue overhang).
Short turning radius.
Low-step entrance and exit.
Low top clearance.
Curb receipt and delivery of passengers.
Ample brake capacity (to provide for frequent stops).
High-low gear efficiency (to provide for frequent starts).

The above points cover the desirable and undesirable features to be considered in the construction of double and single deck buses for regular city routes. As important considerations are involved in the special designing of motor stages and school buses, but time does not permit an enumeration of these factors.

Consideration should also be given to the use of bus trailers in the peak hours of traffic. They should have their own brake equipment.

Gentlemen, out of the motor truck industry will arise in the next few years, The Spirit of Transportation which will give to America automotive transportation of passengers in specially designed motor buses. The nation now needs and can use a sufficient number of motor buses of the various types enumerated, to keep our combined motor truck factories in continuous production for years to come.

Motor Car Transport in South Africa

IN an interview on the Gold Coast, South Africa, as of Aug. 10, His Excellency Brigadier-General Guggisberg, C.M.G., D.S.O., says:

"Motor roads we have in plenty. In fact, we have in the whole of the Gold Coast about 3000 miles of motorable roads open for traffic. That is to say, 700 miles are open all the year round, but the remainder are necessarily closed for a couple of months during the height of the rains. The motor roads, although they have served very well in the past, form an up-to-date system of transport for nothing but short distances. The cost of construction and maintenance is very high, the cost of running lorries on them is also high.

"As an example, the following are the comparative costs of conveying one ton of produce one mile on the Gold Coast:

"By carriers, 3s. 6d. a ton per mile.

"By Ford lorry carrying 15 cwt., 3s. a ton per mile.

"By Ford lorry carrying 15 cwt. and pulling a trailer containing 10 cwt., 2s. a ton per mile.

"By medium lorry carrying altogether about 2 tons, about 1s. 6d. a ton per mile.

"By railway, 3¼d. a ton per mile."

RUST prevention for files and other iron or steel parts is effected in a simple manner by dipping the parts in strong milk of lime and letting them dry as rapidly as possible. As long as the layer of lime remains intact no rust can form. If the parts are used, the lime layer is removed without difficulty by means of a sharp brush. This process, recommended by *Werkstattstechnik*, is especially important in the case of stockrooms that are not absolutely dry.

Right-Hand Steering

Editor, AUTOMOTIVE INDUSTRIES:

It is wrong to think that right-hand steering is a serious requirement in Europe, and in particular in those countries where driving to the left is the custom, as in England, Sweden and some parts of Italy. Why, then, are all the European-made cars right-hand driven? The answer I would give is the following: Right-hand drive seems to have originated from the way horses were, and still are, driven. Anyone knows that the ordinary man can use only his right hand to properly handle the whip. Certainly then he must hold the lines with the left hand. To drive one or many horses properly the lines must be kept in the center of the carriage and thus we see how it is necessary to sit to the right when driving horses. When the automobile was first built it was natural that driving should be at the right, and thus we received the right-hand steering.

On the modern car the control (gear and hand-brake handles) is located in the center of the car, and to operate it with ease and comfort it is necessary to have the steering on the left side, and let the right hand operate the gear shift. Certainly the left steering as practised in America has something to do with driving on the right side of the road, but there was *no* left steering from the beginning, and it is there to-day because the center control is there and must be there to have the car up to date. I think that in a year or two most of the European-made machines will also have the center control, and no doubt they will then soon change to left steering no matter whether the car is manufactured in England, France or Germany. As an example, the French "Citroen" already has left-hand steering, and most British and Italian cars have the center control, although this year more seem to have the right-hand steering.

It is not at all comfortable to drive the average American car with the right-hand steering. Take a car of the $2,000 class and see the difference in the standard car with the left-hand steering and the so-called export model with the right-hand steering. All the manufacturer usually does is change over the steering and the pedals to the right side. When the pedals were on the left side there was plenty of room for the feet and the accelerator pedal was to the right of the foot-brake. There was more than enough room for everything, and to reach the starter button one had only to step on it without using the left foot on the clutch pedal. The same car altered to export model, with right-hand steering, often has the steering wheel located at a slight angle to the instrument board for the reason that the exhaust pipe may have been somewhat in the way to enable the manufacturer to put the wheel straight. This does *not* matter very much, however, but the big thing is the way the pedals and the starter are located. There is *not* the same roominess as on the left side, for the hand-brake lever takes away much space. The accelerator pedal is located between the clutch and brake pedals, and it all looks and feels crowded. When driving the left leg is usually resting on the hand-brake lever, and to reach the starter button one is compelled to use many motions with the feet. In many cases the starter cannot be reached unless the driver gets up from his seat, and in the cases where this is not necessary, the driver has to use the left foot, which naturally means that he has to have the gear in neutral. The exhaust pipe is, in most cases, located on the right side of the motor on the American car. Anyone knows how the heat is felt from the floor board on a warm summer day. In the export car, with right-hand steering, this heat is extremely uncomfortable as it has open flow through the holes for the pedals.

The right-hand driven car has often no changes in the instrument board, consequently the driver cannot easily see the instruments, which usually are located to the left as they are on the standard model. In a few cases the instruments are in the center of the board.

The public in foreign countries really prefers a left-hand driven car, especially when it is an American car. Take, for instance, the Scandinavian countries. In Sweden, where the driving is to the left, it is easier to pass or to meet a car on the road where there is left-hand steering, as the roads usually are narrow and it is important to know how near the road-ditch one may keep the car when meeting another, or how near one may drive when passing a car. In Denmark and in Norway the driving is to the right, the same as in the States, and there is no reason why right-hand steering should be asked for there. The Norwegians at least have awakened to the fact that they do not want anything but left-hand steering.

To sum up, the American manufacturers should forget right-hand steering when filling export orders. Their agents and their customers will be pleased with the left-hand steering, and those cases where the manufacturer charged his $25 extra for the right-steer outfit, the agent will be glad to have this amount reduced on the invoice.

When the manufacturer receives orders from far-away countries, and the order stipulates right-hand drive, it will pay all concerned to have the manufacturer tell his agent that in a right-hand driven car this or that will be out of place and uncomfortable. He should not be afraid of losing the order for that frankness. In every case the agent will say that the standard way is accepted.

BIRGER JACOBSSON.

IN the course of a paper read before the Royal Society of Arts, Sir Charles Bedford said that the Denaturation Subcommittee of the Empire Motor Fuels Committee had conducted an exhaustive practical inquiry, and had come to the conclusion that redistilled bone oil was the substance which most closely complied with the desiderata for a denaturant as laid down by the Board of Customs and Excise. At the present time the Engineering Subcommittee of the same body was understood to be conducting elaborate inquiries on a large working scale in conjunction with the experts of the London General Omnibus Co., and their report was now awaited. Light caoutchoucine in combination with secondary substances, such as shale oils, benzol, gasolines and sulphurous oil residues, came next in efficacy, but it was not known yet whether it would serve for motor purposes.

Developing the Individual for Institutional Responsibility

The Business Publishers Association has devised a course to increase individual business vision and to make business papers of constantly growing value to industry. A school of industrial journalism has been established for developing and training staffs of business publications.

THE progressive development of an organization is usually in direct proportion to the individual growth of the individuals within the group. AUTOMOTIVE INDUSTRIES has frequently pointed out the desirability of increasing the scope of the employee's vision of the business as a whole. Various methods of promoting such individual development has been outlined. Other business papers have discussed the same question at considerable length.

As an indication of a firm belief in the fundamental character of such personal development, the New York Business Publishers' Association has put into operation a plan by which the members of the staffs of the various business papers will be given a comprehensive and thorough training covering the editorial, business, and service activities of industrial publishing. Like any other business, industrial publishing includes a number of separate departments and activities. In order that an individual worker in any department may function at maximum efficiency, he must have a comprehensive knowledge of the policies, ideals, and aims of the other departments of the business.

In addition to these points of similarity with other businesses, however, the business paper staff employee has to deal with problems of fundamental analysis in a peculiar sense. He must be able to weigh relative values, analyze clearly and constantly, and keep in close touch with the entire field in which he is working. The ability to do this can be acquired by experience, but experience alone does not teach rapidly. It is a recognition of this fact that has led the Business Publishers' Association to establish a school of industrial journalism.

The course is designed to meet two urgent needs:

1. The need of individual workers in this field for well organized instruction in the principles and practices of the business.

2. The need of industrial publishing organizations, both small and large, for closer team work among the members of their staffs.

Co-operation of the leading industrial publishers has made the course possible. The idea was originally proposed by H. M. Swetland, president of the United Publishers Corporation, and the plans have been worked out under his leadership by the New York Business Publishers' Association Educational Committee, of which he is chairman. Associated with him on this committee are J. Malcolm Muir, vice-president, McGraw-Hill Company; M. C. Robbins, publisher, *Gas Age*, and president of Associated Business Papers, Inc.; J. C. Oswald, publisher, *American Printer;* E. P. Harris, of Harris, Dibble & Company; and R. H. McCready, president, McCready Publishing Company, and president of the New York Association.

The "study-unit" plan will be used in conducting the course. This plan, which combines home study and weekly class meetings, has been developed by the Business Training Corporation, which has been engaged to prepare the text and other educational material and to organize and direct the instruction staff. All the instructors will be men who are now engaged in industrial papers, so that the instruction will be intensive and practical.

Special texts on the subjects covered in the course are being prepared with the aid of a Cooperating Staff of forty well-known publishers, editors, business managers and service department managers affiliated with the New York Business Publishers' Association. These men have supplied the material and data which will be the basis of the course.

The increased influence of business publications during recent years has made such a course as this specially desirable. This increased influence has brought with it increased responsibilities. Subscribers and advertisers have learned to expect types of service which cannot be rendered without special effort and organization. This course marks a definite recognition by industrial publishers of these responsibilities and obligations.

Considerable interest in this course has been evinced by men not directly associated with business publishing, while within the ranks of the publishers the idea is being supported with enthusiasm. The course will be taken by practically all of the business and editorial executives of the papers affiliated with the association. Several men in different industries have also signified their desire to get the insight into industrial publishing offered by the course. Such men from the outside will be welcomed.

The entire course will last eight or nine months. Classes are being organized and will begin work within a few weeks. In addition to classes for members of the New York Business Publishers' Association, arrangements will probably be made for classes for business paper organizations in Chicago, Boston, Philadelphia, Cleveland, St. Louis and other cities.

The course is organized in fifteen study-units, each one of which is devoted to a distinct subdivision of the general subject. Each study-unit requires two weeks. The length of the whole course, therefore, is thirty weeks, which is equivalent to the customary university year.

A general outline of the course indicates clearly the broad scope of the material to be covered together with the practical nature of the training:

SECTION A—INTRODUCTORY

UNIT I—THE FIELD OF INDUSTRIAL PUBLISHING

1. Fundamental functions of an industrial paper.
2. Scope and influence of industrial papers in modern business.
3. Evolution and growth of industrial publishing—in the United States—in relation to foreign countries.
4. Distinctive features of industrial publishing—in relation to

other lines of business—in relation to other kinds of publishing.
5. The ethics of industrial publishing.
6. Opportunities for intelligent productive service and for personal advancement.

UNIT II—ORGANIZATION AND PERSONAL REQUIREMENTS

1. Main activities in industrial publishing—editorial—business—service.
2. Organization of an industrial publishing business—departmental relationships and teamwork.
3. Recruiting the organization—sources—methods.
4. Personal traits required on an industrial paper—methods of developing these traits.
5. Self-analysis tests.

SECTION B—EDITORIAL ACTIVITIES

UNIT III—EDITORIAL CONTENTS

1. Determining the general editorial policy.
2. Types of articles desired—sources for securing them.
3. Handling regular departments and current trade news.
4. Getting the right point of view of the industry—keeping in touch with the industry.
5. Cultivating editorial judgment—testing news value.
6. Keeping ahead with editorial policies and opinions.

UNIT IV—EDITORIAL METHODS

1. Gathering material and data—from industrial leaders—through field correspondents—miscellaneous sources.
2. Classifying and filing material and data—inclusive index files—compiling illustrative and statistical data.
3. Planning and scheduling editorial work.
4. Budgeting editorial expenses.
5. Managing an editorial staff.

UNIT V—PREPARING EDITORIAL MATERIAL

1. Preliminary steps—picking live questions—outlining articles—classifying sources.
2. Field investigating—gathering information—making notes—securing illustrations—checking up.
3. Writing the article—style—giving current interest.
4. The art of interviewing.
5. Reporting conventions and other meetings—verbatim reports—journalistic reports.
6. Testing articles and other reports.

UNIT VI—WRITING FOR INDUSTRIAL PAPERS

1. Essentials of good style.
2. Securing unity—through outlining—through avoiding extraneous matter.
3. Securing coherence—by proper arrangement of ideas—by accurate connectives.
4. Securing force—by concreteness—by repetition—by emphasis.
5. Making news value count.
6. Use of illustrations, charts, tables and summaries.

UNIT VII—PRODUCTION TECHNIQUE

1. Preparing manuscript for printer.
2. Typography—various type faces and their uses—colors.
3. Physical appearance of publication—paper—illustrations—layout.
4. How editorial and advertising departments can lessen work in print shop.
5. Proofreading and final changes.
6. Procedure in print shop and bindery—typesetting—electrotyping—printing—binding.

SECTION C—BUSINESS ACTIVITIES

UNIT VIII—CIRCULATION-BUILDING

1. Code of ethics governing business activities in industrial publishing—what constitutes good business practice.
2. Selective basis of circulation.
3. Lists of prospective subscribers—sources—analysis—checking.
4. Circularizing and follow-up plans and methods.
5. Personal solicitation for subscriptions—part time agents—full time salesmen.
6. Space advertising for subscriptions.
7. Special book and other offers—uses and dangers.

UNIT IX—CREATING ADVERTISING

1. Selective basis of advertising in industrial papers.
2. Six essential conditions for profitable advertising—analyzing and testing for them.
3. Advantages of industrial papers as advertising mediums.
4. Rates for advertising space—based on quality, circulation and publication's influence.
5. Classes of advertising prospects.
6. Sales promotion methods to secure advertising.
7. Principles of salesmanship in securing advertising.

UNIT X—HANDLING CORRESPONDENCE

1. Importance of correspondence in building good-will.
2. Fundamentals of good business letter writing—adaptation to reader—correct analysis—careful planning.
3. Beginnings and endings of letters.
4. The five C's of a good business letter and how to attain them—clearness—correctness—conciseness—courtesy—character.
5. Sentence structure and paragraphing.
6. Getting action through letters.
7. Special types of letters—editorial—circularizing—selling—collecting—adjustment.

UNIT XI—ACCOUNTS AND COLLECTIONS

1. The necessity of especially accurate records in industrial publishing because of long-term contracts—allocating expenses and incurred obligations.
2. Chief items of income and expenditure—classification and percentages.
3. Characteristics of good records—accurate—timely—simple—adequate.
4. Using accounts in management—comparative statements to show tendencies—unit costs.
5. Use of statistics—charts and graphs.
6. Budgeting and checking up actual against estimated results.

UNIT XII—DEPARTMENTAL MANAGEMENT

1. Fixing definite quotas and objectives.
2. Establishing standards of performance or output.
3. Making conditions right for effective work.
4. Systematizing routine operations.
5. Scheduling and dispatching.
6. Layout of an office—of a desk.
7. Mechanical aids to efficiency—records—charts.
8. Handling employees—getting teamwork.

SECTION D—SERVICE ACTIVITIES

UNIT XIII—SERVICE TO THE INDUSTRY

1. Special research and studies for the benefit of the industry as a whole.
2. Creating industrial literature in the fields served.
3. Handling and answering general inquiries in the industry.
4. Compiling statistics and general data.
5. Issuing reviews and forecasts.
6. Studying foreign conditions and markets and promoting foreign trade within the industry.
7. Preparing handbooks, annuals and directories.
8. Working with trade associations and technical societies.
9. Influencing public opinion and governmental bodies.

UNIT XIV—SERVICE TO ADVERTISERS

1. Service on mechanics of advertisement—display—type—illustrations.
2. Service on message of advertisement—the right note—preparation of copy—headlines and sub-heads.
3. Furnishing special information on the industry—data on viewpoint of industry—business and marketing conditions—technical development in industry.
4. Studying and analyzing merchandising problems.
5. Helping to check plans and results.
6. Relation of advertising service department to advertising agency.

SECTION E—ETHICS AND POLICIES

UNIT XV—ETHICS AND POLICIES IN INDUSTRIAL PUBLISHING

1. Standards of editorial practice.
2. Standards of business practice in relation to circulation building and advertising.
3. Standards of practice with relation to competitors.
4. Ethical principles covering relations with industry and with advertisers.
5. Determination and formulation of basic policies of an industrial paper.
6. Present tendencies in industrial publishing—greater specialization—combinations.
7. Preparing for the needs and problems ahead.

The Basis of Industrial Understanding

It is easy to desire to deal fairly with employees, but hard to work out the theory. Because of past occurrences, many workers regard employers with suspicion. This makes difficult a practical application of the square deal idea. Considerable study necessary to obtain results.

By Harry Tipper

A GOOD many of the letters received from the subscribers to AUTOMOTIVE INDUSTRIES from time to time reiterate the statement that it is not so much the method of operation as the square deal with the employees which counts in building an organization.

There is no doubt about the truth of this statement in the abstract. As a practical matter, however, the difficulty of getting to an agreement is not removed by any sentimental desire for a square deal or by the consideration of platitudes and truisms relating to it. A very few conversations with employees on one hand and workers on the other hand reveal suspicion and a general belief on each side that the other side is not dealing in actions and holding opinions which are fair.

Many times employers have stated to me their desire to be fair with their workmen and in the same breath have stated the impossibility of dealing squarely with them on account of the unfair opinions they hold and the unfair actions they take. On the other hand, workers have frequently pointed out the injustices from which they suffer or think they suffer and the impossibility of believing the employer who permits such injustices to go on.

This division is sharp and pretty general. The suspicion is of long standing. No habit of mind which is of long standing can be changed rapidly and with ease. Prejudices that are deep-seated cling very tenaciously and are not removed by an abstract desire for agreement or a vague belief that peace is better than warfare.

A very large part of the general cry for understanding is a demand that the other man understand us and make all the allowances that should be made for our prejudices, our weaknesses, and our values.

Justice is based upon understanding, but the understanding must be broader than ourselves and particularly it must take in a thorough understanding of the other parties. Square dealing is not governed by a desire to be fair, but by the understanding which makes it possible to be fair. And that understanding is rarely secured, although the desire for square dealing is fairly general. Therefore, it is necessary not merely to discuss the principles which enter into productive co-operation, but it is important to consider the methods by which the co-operation has been secured in the individual cases, because the practical result can only be obtained by the patient working out of the improvement.

Just as the experimental department is the scientific laboratory for mechanical improvement and industry, so the factory is the industrial laboratory out of which grows the human development. The men who are engaged in the experimental work are prepared to follow carefully and relentlessly every clue to improvement which may be suggested to analyze, test, and operate all these possibilities until the conditions are thoroughly understood and the improvement can be turned into practical reality.

Something of the same kind is required in the development of human relations within the establishment. The same painstaking study, experimenting with, the testing and rejecting of many methods before sound practice is discovered, must govern the development of the productivity in relation to the human affairs of industry itself.

Comparatively few executives are willing to undertake a somewhat difficult study of the human side. They are buried in the technical requirements of their own work, in the mechanics of organization or in the economics of the propositions before them. The reports which come to their desk do not contain any expressions of human value or quality. They do not deal with incentives, fatigue, or aspirations, and they do not suggest a waste which is going on from a human standpoint. The ordinary duties devolving upon the executive are not such as to emphasize the human side or lead the imagination into the consideration of the human causes behind the economic effects.

This is sufficiently the case to give rise to the mistake of considering economic effect as causes, and we talk of these economic conditions as though they were the reasons for the development of business tendencies and situations, instead of the effects produced by our methods of human organization and our difficulties of human understanding.

Very few men in industry would answer in the negative if they were asked, Do you believe in dealing squarely with your employees? On the other hand, very few men devote a considerable part of their time to the discovery of the human causes behind the inefficiencies exhibited in the mechanical results and to the patient consideration of the methods by which they can be overcome.

Two years ago, when the amount of labor was less than the demand for it and the efficiency of labor was lower than usual, a good many executives in industry were spending a lot of their time in an endeavor to meet the labor difficulty without any previous knowledge of the causes and without much hope of arriving at a more than temporary solution.

Just now while labor is plentfiul and there is a large amount of unemployment, and as a consequence the efficiency of labor is a little higher, very few of those men are continuing their study and endeavoring to provide themselves with the information which will enable them to meet future difficulties better than the past difficulties were handled.

Even in the best of organizations employees are prone to suspect the motives and justice of the employers. There is a tendency for every man to overemphasize the value of the services he renders and the influence exerted by those

services upon the total result. This runs through all ranks of workers. It is interestingly displayed in the speeches of engineers, doctors, advertisers, salesmen, and others, who in acclaiming publicly the importance of their own occupation, show the extent of its influence upon civilization, so that the unprejudiced reader would be able to determine whether religion had been of as much importance as salesmanship, or engineering had done as much work as advertising.

Because of this tendency and because of the limited range of interests and understanding, there is always large ground for suspicion. We are always apt to suspect those things of which we know little, and the decisions rendered, because of evidence we have not reviewed, are apt to meet with our criticism.

It is in the solution of these small problems of personal grievances in the development of confidence between individuals that the executive becomes trained in the causes of human inefficiency and becomes capable of approaching the larger problems with some hope of solving them or preventing the larger problems from becoming active by the solution of the smaller ones.

It is particularly unfortunate that executives in industry do not study the human side of the matter until they are confronted with a strike or a general difficulty or some unusual inefficiency. They are obliged to approach the large problem without any previous experience with the small problem and with no established confidence arising out of the personal adjustment.

It is impossible under such conditions to arrive at a solution of the larger problem and it is unlikely that we shall do anything important in the advancing of human relations in industry until the same time and patience are put upon the daily individual difficulties that are put upon the routine and the economics of the large problems of strikes and general disturbances.

We are much better advised in economic affairs and our methods of education are much more effective in that regard. We do not attempt to put the young engineering student in front of the complicated problem of managing a huge industry. We train him in the solution of the simple and more primary problems, so that in each stage of his development he is encouraged to tackle a somewhat larger problem, until he is capable of handling the most important.

In most of the cases of successful industrial establishments, securing an unusual efficiency per individual and unusual freedom from industrial disturbances, the work has been done principally by the ability of the executives in adjusting the personal differences, their understanding of personalities, and their gradual gain in experience, so that the larger matters have been solved more or less readily upon the background of the previous work.

There is a general impression that intangible subjects like this one may be dealt with by any observing individual without the patient development of the skill and understanding required in the mastering of mechanical pursuits. This impression is widespread and is perhaps the greatest difficulty in the way of development from the human side of organization. On the other hand, the economic results secured by executives who have devoted time and patience to the study have been sufficiently important to justify the work which they have devoted to the matter.

The present period of depression is usually considered as a period which will be followed by a gradual extension of the business with more difficulties in securing a profit. All such previous periods have demanded a greater efficiency in the production in order to surmount the difficulties imposed by the new conditions, and the progress in the mechanical arts has come largely from these necessities.

The manufacturing capacity of the United States at the present is almost three times per capita the capacity of either Great Britain or Germany, and as a consequence the problem of disposing of enough product to fill our factories is a very serious one. Part of this problem must be met by the increased efficiency of production, and in a large measure this increased efficiency will come out of the increased productivity of the individual.

A good many changes can be made in the mechanical systems but the improvements that can be secured in this respect will not be sufficient at any particular time to affect the total result except in minute percentages.

The capacity of the individual has not been increased even though it fluctuates under different economic conditions and there is a large unused capacity which would permit improvements in productivity in very great amounts if this unusual individual capacity could be harnessed. It can be harnessed only as the confidence, the incentive, the interest in the work and the character of the reward agree with the organization requirements and keep the enthusiasm of the worker centered upon his organization and his work.

This desirable condition is not to be arrived at by merely talking about the square deal or an academic desire for the square deal. It will be secured by a careful study of the individual problems, adjustment of personal grievances, and extension of education and understanding within the plant.

In this, as in a number of other human problems related to industry, that way which appears to be the longest way round is the shortest way to the permanent conclusion. Temporarily it is easier to control an organization by instructions and orders than it is by education and understanding, but the centralized systems of instructions and orders do not develop the individual and they provide no incentive for development. They fail finally because of this fact, while the slow apparently inefficient and unsystematic method of creating confidence between the individuals, adjusting the personal differences, educating the minor executives on the purposes of the organization and developing the possibilities of the workers in their own work, result in a final efficiency far greater than the efficiency produced out of the centralized systems, subdivided work, the rule, and the control of instruction.

SEVERAL rings have recently been tested by the ball method at the Bureau of Standards in Washington. The method used is a modification of that heretofore employed which uses two balls the sum of whose diameter is slightly greater than the diameter of the ring. The new method consists of placing three balls of the same diameter in a ring 120 deg. apart with a fourth ball resting on them. This method gives substantially the same results as the two-ball method. In this connection there is need for a more accurate method of governing the contact pressure in measuring precision balls. The machine with a drop plug indicator on which this work is now done has sufficient friction in the anvil end to cause an uncertainty in the measurement of the contact pressure used. To provide a better means for measuring balls, and also for comparison of precision gage blocks by mechanical means, drawings of the Millionth Comparator used at the National Physical Laboratory, England, and by the Pratt & Whitney Co. have been secured and it is to be expected that a similar comparator will be constructed at the bureau.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE
Reg. U. S. Pat. Off.

PUBLISHED WEEKLY
Copyright 1921 by The Class Journal Co.

Vol. XLV Thursday, September 29, 1921 No. 13

THE CLASS JOURNAL COMPANY
Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
U. P. C. Building, 239 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
David Beecroft, Directing Editor
Norman G. Shidle, Managing Editor
P. M. Heldt, Engineering Editor
Herbert Chase

DETROIT OFFICE
J. Edward Schipper

WASHINGTON OFFICE
816 Fifteenth St., N. W.

BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—317 Fort Street, West, Phone Main 1351
Cleveland—536-540 Guardian Bldg., Phone Main 6432
Philadelphia—1420-1422 Widener Bldg., Phone Locust 5189
Boston—185 Devonshire Street, Phone Fort Hill 4336

Cable Address.....Autoland, New York
Long Distance Telephone.....Bryant 8760, New York

United States and Mexico.....One Year, $3.00
Extra postage west of the Mississippi River on account of Zone Postage Law, 0.50
Canada.....One Year, 5.00
Foreign Countries.....One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

The German Show

THE German automobile show, which opened in Berlin on Sept. 22, is of special interest this year because it shows the engineering and commercial status of the German industry for the first time since the war. The designs presented at this show represent the accumulated experience of German engineers during the last seven years.

While only brief reports are available at this time, the special cable report, printed on the news pages of this issue, indicates several interesting trends. Chief among these is the fact that the show was apparently far more than an automobile show—it was, in a sense, an automotive show. Not only were automobiles and accessories exhibited, but also trucks, bodies, motorcycles and even machine tools. Thus it would appear that this post-war Berlin show was designed to interest every group from the car user to the manufacturer. It will be particularly interesting to learn the reasons for giving the show so broad a scope.

The Germans are apparently about to make a strong bid for foreign automotive trade. The low value of the mark, of course, will aid them materially, while the efforts they have made to achieve simplicity of design and minimum production costs will be a helpful factor. An additional indication that the show is an effort in this direction is the fact that all foreign cars were barred, even Austrian cars having been prohibited from exhibiting.

Gear Changing

IT is well known to every automobile driver that with a sliding pinion change gear it is ordinarily much more difficult to change from a higher to a lower gear than vice versa. It is not much of a trick to change from first to second without grating of the gear teeth, and changing from second to high, in case of a three-speed gear, involves no difficulties at all, as no gears have to be meshed and the clutch jaws slide readily into engagement.

When the clutch is disengaged and the gears are unmeshed, both the clutch-driven member and the car slow down in speed, owing to the resistances encountered in their motion. If the change of gear is made very fast, there will be no appreciable change in car speed between the unmeshing of the low and the meshing of the intermediate gears. As the intermediate gear is engaged the clutch speed must be reduced. There is a natural tendency for the clutch to slow down in speed owing to its bearing friction, and this probably explains the comparative ease with which the change from low to intermediate gear can be effected as a general rule.

The change from high to intermediate and from the latter to low is not so difficult on a steep hill, as in that case the speed of the car decreases very rapidly when the gears are unmeshed and assumes a value corresponding to the lower gear to be engaged. In fact, it is usually necessary to shift the gears quite smartly, otherwise the car will lose too much speed and will be hard to keep under way. But occasionally it is desired to go into intermediate or low gear for the sake of accurate control, in places where the road is comparatively level. The car then loses speed only slowly and it is almost impossible to make a quick change of gear without unpleasant gear noises. Either the driver has to wait until the car has slowed down a great deal or else he must speed up his engine and partly engage the clutch while the gears are out of mesh, so as to bring the speed of the clutch into correspondence with that of the car on the gear to be engaged. This latter operation is a rather delicate one and is fully mastered only by few drivers.

Generally speaking, gear shifting is the easier the less the difference in the ratio between successive gears. With a four-speed gear the ratios between successive gear speeds are smaller, as a rule, than with a three-speed gear, and a four-speed gear should, therefore, be easier to handle than a three-speed. Of course, the inertia of the clutch is an important factor in every case. When the gears are meshed, the speeds of the clutch and of the car are brought into a definite relation, which generally means that one has to speed up and the other slow down. As the inertia of the clutch is ever so much less than

that of the car, by far the greatest change takes place in the speed of the clutch, and the force of the impact when the gears are brought together depends almost entirely on the polar moment of inertia of the clutch-driven part.

The Gasoline Tax

NO statement is quite so misleading as a half-truth. Advocates of the gasoline tax in various states have pointed out that such a tax is fair because it is a somewhat accurate gage of the degree to which a vehicle uses the roads. There is a certain degree of truth in this assertion, but the other factors bearing on the situation are such as to entirely destroy its validity for argumentative and legislative purposes.

To begin with, all gasoline is subjected to the tax. Thus, many gallons are taxed which never find their way into motor vehicles used over the roads. The chief fallacy of the argument, however, lies in the fact that many other motor vehicle taxes operate simultaneously with the fuel tax, thus obviating the function of the fuel tax as a proportioning medium.

Ten new states have added a gasoline tax within the last year, yet in no case has there been any diminution of other motor vehicle taxes. The fuel tax has simply been placed on top of other taxes in every instance. It is not a substitute tax, but an added tax burden.

Thus, even a slight analysis shows the unsound basis of the half-truth brought forward in favor of gasoline taxes. Yet a recent N. A. C. C. survey brings to light the surprising fact that motorists in many states were found supporting the fuel tax on the basis of this fallacious reasoning. If the gasoline tax were made the only tax imposed upon motor vehicles in any one State, and if such a tax were apportioned in accordance with the usage which such a vehicle obtains from the highways, there would be a valid argument in its favor. As the matter stands, however, this very definitely is not the case. The gasoline tax simply imposes upon owners an increased tax burden, increases sales resistance for those selling motor vehicles and fails to meet the requirements of a sound taxation policy.

International Trade

THE suggestion has been made that American manufacturers would enhance their prestige in many countries by substituting the word "international" for the term "export" or "foreign" as used in their correspondence, literature and advertising. Export or foreign, as terms, have no meaning when they are read in another country. The American manufacturer, of course, can consider his business in China, we might say, as being foreign, but it is not foreign to the dealer or buyer there. The same may be said of "overseas" or similar other designation.

Translations of English into other languages almost without exception turn such words into the equivalent of "foreign" or "foreigner," and the buyer or dealer in another country thus sees himself considered as a "foreigner." This term usually carries with it something of unpleasantness, as is evidenced in our own use of it in regard to the hordes of immigrants who have come to this country from Europe. The term is no more pleasing in other countries and its use may set up a conscious or subconscious barrier that does not promote friendly relations, although it may have been used entirely in a business sense.

The word international is more pleasing; it conveys an idea of size and spread that is readily appealing and certain companies have incorporated this into the name of their export company.

Increased Salaries for U. S. Foreign Consuls

A NUMBER of United States consular officers in England have resigned within the past year because of a lack of sufficient pay to allow them to maintain the living standard set by representatives of other nations. For many years various interests have endeavored to have this situation remedied by increasing the salaries of the men who represent this country's business interests abroad. Despite these efforts nothing has been done.

Our foreign consuls play an important part in America's export trade and they surely deserve a monetary consideration consistent with the efforts they expend. In the past they have frequently benefited the manufacturer of automobiles in supplying him with information that otherwise would have been unattainable without considerable expenditure of time and money. But all these facts are too well known to deserve discussion here. The fact that these men, who remain at their posts, are forced to deprive themselves of many of the things that have always been considered necessities should be enough to enlist the whole-hearted support of manufacturers in the effort to secure increased salaries for them.

Statistics have been presented showing that the salaries of American representatives abroad are from 30 to 40 per cent less than those paid to men holding similar positions from other countries. The average salary of American consuls general is but $6,620 a year. Consuls of Great Britain (not consuls general) receive an average total payment of from $6,983 to $7,056, while Americans holding these positions receive an average salary of $3,720. And British business men are complaining that the salaries of their representatives are too low.

Honor is, of course, attached to a consular position, but the functions of the consul require men of real business ability. Only such men are capable of rendering valuable service to the industry. But because they are capable of rendering this service their ability if expended along other lines would be recognized to a greater extent so far as salaries are concerned. Again, the type of men who accept a position for the honor alone are not generally those capable of performing the duties the consular service is expected to perform.

Production Decline Not Imminent

September Business Is Exceeding August

Collections Generally Good With Progress Made in Reducing Past Due Accounts

NEW YORK, Sept. 27—Reports of current business made by members of the Motor and Accessory Manufacturers Association to the credit department show that their business for September is running slightly ahead of August. A considerable amount of new business has been booked which indicates that no falling off in the production of passenger cars is imminent. Collections generally are good, and they show an improvement from month to month. Progress also is being made in cutting down past-due accounts. Indications are that business for the next two or three months will continue about as it has been running since May.

Fully as significant as the actual business booked is the feeling in all branches of the industry that the worst is over and that the tide has turned definitely toward better conditions. Improved morale is apparent throughout the industrial world and is reflected in nearly all lines. Leaders among financiers and manufacturers are convinced that the business depression has been due largely to a state of mind and that once optimism dispels pessimism throughout the country the consumption of finished products will increase, unemployment will become less general and buying power will expand.

August Business Better

So far as the parts makers are concerned, their chief complaint is against automobile companies which have failed to release partly fabricated materials ordered 15 months ago. There are a considerable number of companies in this group and it is felt that if they ever are going to get out of their difficulties they should have made some progress by this time. This does not apply so much to the truck field because it is realized that truck sales have been virtually at a standstill for many months.

There is little complaint against the companies which actually are doing business and have been to some extent ever since the depression began. There have been of late comparatively few cancellations and automobile manufacturers have shown a disposition to clean up their commitments when price concessions have been made.

The report of August business made by members of the M. A. M. A. shows that there was a slight increase in the total of goods sold as compared with July and very little reduction in the total of past due accounts.

M. A. M. A. MEMBERS' BUSINESS FOR 8 MONTHS

NEW YORK, Sept. 27—The following table shows at a glance the business done each month this year by the members of the Motor and Accessory Manufacturers Association together with the total of past due accounts held by members, the total notes outstanding and the percentage of change each month:

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.

Walsh Gasoline Tax Proposal Unpopular

WASHINGTON, Sept. 27—The proposal of Senator Walsh of Massachusetts to incorporate in the tax bill a tax of one cent per gallon on gasoline will probably fail to receive serious consideration from the Senate. Though the author is a minority member of the Senate Finance Committee, his substitute will not receive the approval of the Republican majority at this time because they are determined to push the plan of tax revision as adopted by the Finance Committee.

Based on estimates of gasoline consumption for the calendar year of 1920, the one-cent tax per gallon would yield approximately $50,000,000 annually. This tax was originally suggested by Secretary of the Treasury Mellon, in his recommendations for tax revision. The nation-wide protest from automobile owners, as well as manufacturers, had its effect and the proposal was subsequently withdrawn by the Treasury in its revision on proposed tax assessments.

There will be a long debate on the various provisions of the House bill as amended by the Senate Finance Committee.

JOYCE NAMED TRUSTEE

EAU CLAIRE, Sept. 26—J. T. Joyce of Eau Claire, Wis., has been appointed trustee of the bankrupt estate of the United States Auto Gear Shift Co., of the same city, which recently filed a voluntary petition, scheduling liabilities at $278,424 and assets at $749,258. Creditors will meet Oct. 1.

Athol Denies Making Use of Unfair Methods

WASHINGTON, Sept. 26—Denial has been made by the Athol Manufacturing Co. that it is or has been using unfair methods in the production and sale of artificial leather as alleged in the complaint filed by the Federal Trade Commission. The company asked the commission for a further and fuller investigation which, it says, will establish the true status of artificial leather as a useful and advantageous product. This case is of particular interest to the automotive trade because Athol top material and Athol leather are used on certain cars and tops.

The company advised the commission that the artificial leather made by it and its competitors is coming into wider and wider use and is supplanting the use of genuine leather in many lines and for many purposes. It declares that there is now real competition between its business and the business of dealers in ordinary old fashioned genuine skin and hide leather.

FORD STARTS BODY SHOP

MILWAUKEE, Sept. 26—The Ford interests are starting work on a large body shop at Iron Mountain, as the second principal unit of an enormous woodworking operation established in the heart of the Upper Michigan forest and mining district, according to advices received here. The bulk of the wood products required by the Ford passenger car, truck and tractor industries is to be furnished by the Iron Mountain plants, which are situated in the midst of one of the richest hardwood and softwood timber belts in the world and adjacent to the famous hardwood belt of extreme northern Wisconsin. Carloads of lumber, timber, bolts and other wood products are being shipped almost daily.

Display in Berlin Is Impressive

German Makers Hold First Post-War Show

Exhibit Discloses Industry on Full Production Basis—Use of Aluminum General

BERLIN, Sept. 26 (*By cable to* AUTOMOTIVE INDUSTRIES)—Germany's first post-war automobile show opened yesterday in the specially constructed Kaiserdamm Palace, which is 820 x 230 feet, in the northern suburbs of Berlin. It also marked the official opening of Berlin's 12-mile speedway which belongs to the Manufacturers Automobile Club. The show is entirely German and even Austrians are barred.

The exposition contains exhibits by 58 passenger car manufacturers, 34 truck makers, 35 body builders, 40 accessory concerns and 30 machine tool companies. It discloses clearly that the German automotive industry is again established on a full production basis. Because of the low value of the mark it is prepared to make a serious bid for foreign markets. The attendance is large and foreign buyers are plentiful.

With rare exceptions the cars are all up-to-date in design and represent the cumulative experience of the last seven years' attempts to bring production costs down to a minimum. Few German makers are following the American simplified design as German manufacturers generally prefer a higher grade, rather more costly type.

From an engineering point of view the feature of the show is the more general use which is being made of aluminum.

Eighty per cent of the cars displayed have four cylinder engines, 16 per cent six cylinder, 1 per cent eight cylinder and none of 12. Detachable heads are found in 11 per cent of the engines.

Mercedes is using steel cylinders in all models. There is a pronounced tendency toward aluminum steel lined cylinders, overhead valves, electric lighting and starting in most of the models. Ninety per cent of the cars are Bosch equipped.

The unit power plant construction is seen in 21 per cent of the engines; separate transmission in 78 per cent; four speed transmission in 83 per cent; spiral bevel drives in 39 per cent and straight bevels in 59 per cent.

Straight side tires are unknown on passenger cars but giant straights have made their appearance on many trucks. It is declared here that the Continental Caoutchouc and Gutta Percha Co. has come under control of the B. F. Goodrich Co.

There also are reports that the Packard Motor Car Co. has purchased a factory in Poland and that Ford has obtained control of the Hansa-Lloyd Automobile Co. in Bremen.

Maybach, the former co-worker of Daimler and noted as an airship manufacturer, has produced a car without clutch and gear box and with an electric motor sufficiently powerful to drive the car at low speeds, but with an emergency gear. The engine is a six cylinder, closely resembling the Dutch Spyker engine which is manufactured by Maybach. The rear axle is of aluminum and the car has front wheel brakes.

Rumpler, the aircraft manufacturer, has produced a passenger car with scientific stream lining. The chassis is in the form of a forged steel hull. It is powered with a six cylinder all aluminum W type engine. It is designed for rear driving with the rear wheels without universals. All the mechanism, including cantilever springs, is inside the hull.

Stinnes is showing a low priced cheap production car with a four cylinder all aluminum overhead valve engine.

W. F. BRADLEY.

Goodrich Denies Report

AKRON, Sept. 27—W. C. Arthur, manager of the International B. F. Goodrich Corp., which controls the foreign holdings of the Goodrich company, denies that it has acquired or contemplates acquisition of the Continental company as reported in Paris.

No Packard Plant for Poland

DETROIT, Sept. 27—The Packard Motor Car Co. denies that it has purchased an assembling plant in Poland. Such a proposal was made to the company several months ago but it never was considered seriously.

British Ensign Motors in Hands of Creditors

LONDON, Sept. 16 (*By Mail*)—A chassis at the 1919 Olympia show which attracted great attention largely because of its massiveness combined with the high finish of its parts was the Ensign "six." Its introduction was typical of the senseless boom characteristic of that show. The sequel was told this week at a conference of creditors for a private arrangement of its affairs. Total liabilities disclosed amounted to $1,220,590. It was agreed that creditors for over $100 should secure $2.50 per $5 of debt in four installments. The alternative was a forced realization of assets which it was stated would yield but 75 cents per $5 debt. This company built a fine factory on apparently little that was tangible as regards prospects.

Revere Stock Sale Results in Arrest

Buffalo Broker Who Bought Shares Before Receivership Charged with Extortion

INDIANAPOLIS, Sept. 26—J. R. Porter, a Buffalo broker, was arrested at Logansport last Friday at the request of the police of Erie, Pa., on charges of extortion. Several weeks ago Porter filed charges of grand larceny against Newton Van Zandt, former president of the Revere Motor Car Corp. Porter said he would waive extradition and return to Erie when officers from that city arrived. He will say nothing concerning the charges against him.

Prior to his arrest, Porter appeared before the Cass County Grand Jury which is investigating the affairs of the Revere corporation, which is now in the hands of a receiver. He appeared as a stockholder of the company.

Van Zandt contends that he never met Porter but that the Buffalo man bought 330 shares of Revere stock from another broker for $8 a share. Van Zandt says that after he retired from the company several months ago, Porter wrote him a letter saying that he had resold the stock to a client who could not afford to lose the money which resulted from the decline in the value of the stock following the financial difficulties of the company. Van Zandt declares Porter wanted him to make good the difference but that he declined to do so because it might establish a precedent for many cases of the kind for which Van Zandt was not responsible.

A release from liability given Van Zandt by the Revere corporation came to light last week. Van Zandt is now in New York and his friends assert that he was not in any way responsible for the difficulties of the Revere corporation.

BLAME PUT ON SPEEDING

WASHINGTON, Sept. 27—Analysis of statistics compiled by the Maryland State Roads Commission dispels a popular belief that most automobile accidents occur on the sharp curves, grade crossings and steep grades. It has been found that the vast majority are caused by the recklessness of motorists, and 90 per cent are due to speeding. Maryland authorities discovered that the largest number have occurred at the places that have always been considered safe, while the sections of roads which have been commonly regarded as extremely dangerous are proving to be relatively free from accidents.

Truck Possibilities Extensive in Canada

Potential Users Number 102,740; Ontario Obvious Field Awaiting Development

WASHINGTON, Sept. 27—According to latest available statistics the motor truck field in Canada is capable of a more intensive development by American manufacturers, according to a report received from Consul Felix S. S. Johnson, Kingston, Canada, as in 1920 there were in use in the Dominion 26,852 trucks. This indicates that motor transportation occupies a guaranteed place among the Dominion's carrying systems, and that the sale of trucks has barely commenced. The real market remains to be developed, and therefore it presents attractive possibilities for enterprising American manufacturers.

Quebec Good Prospect

A study of the commercial situation shows that while there are only 26,852 motor trucks in operation at present, there are approximately 102,740 industrial or commercial firms which must sooner or later come into the truck-using category, and this list does not include the farming element, which is gradually coming to appreciate the value of the truck as a carrier of farm products to the markets. The same figures indicate that Ontario is the obvious field which awaits development, as out of the total of the 102,740 concerns mentioned, 38,036 are located in this province. Next comes Quebec, with 29,573; Nova Scotia with 7138; Saskatchewan with 6013; British Columbia with 5761; Manitoba with 5414; Alberta with 5096; New Brunswick with 4601 and Prince Edward Island with 1108.

Draft Horses Scarce

As an encouragement to motor truck manufacturers, there is the fact that heavy draft horses, of the kind most suitable for use on trucks, are becoming more and more scarce. Some industrial concerns state that they would be quite willing to use horses on their trucks, if the right grades could be had, but in the absence of enough heavy draft horses to meet their needs, they are falling back more and more upon motor trucks. The distribution of truck registrations for the province of Ontario shows that the big firms are leading in this line, as firms are credited with owning 26.91 per cent, while business gets 23.67 per cent of those operated. Tradesmen come next with 18.17 per cent, the unclassified have the same percentage, while farmers follow with 7.22 per cent and the manufacturer drops to the end with 4 per cent.

Produce Two Cars Daily at Plant of Pan Motors

ST. CLOUD, MINN., Sept. 26—President C. D. Schwab of the Pan Motor Co. reported to a meeting of stockholders that while the drop forge plant had been closed entirely for a year and the motor plant during the winter, operations have been resumed on a greatly reduced basis in the automobile factory and that an average of two cars daily now is being produced. He said that 200 cars have been turned out since the factory resumed operations and that with the material now on hand 69 more will be made before Oct. 1.

The outstanding indebtedness of the company was reduced by $373,853 during the year. The remaining indebtedness is offset by the raw steel products on hand at the drop forge plant and more than 100 unsold cars. The stockholders consider favorably a proposal to issue $1,000,000 in preferred stock with local banks as trustees.

Interlocking Cord Receiver Discharged

AKRON, Sept. 27—Elihu Harpham has been discharged as receiver of the Interlocking Cord Tire Co. of this city and Mogadore following an agreement reached by the new management of the company with creditors, whereby all creditors' claims are to be satisfied. The basis of settlement will include a 15 per cent cash payment of all claims within 45 days, the balance to be secured by one and two year notes.

According to Edward Kohl, president of the new board of directors, the company has $22,000 in cash with which to make initial payments on creditors' claims, and has $13,600 in promissory notes and $7,200 in other notes. Of the cash, $12,000 was raised through subscription of stockholders.

Harpham was named receiver of the company Jan. 17, when the former officers were indicted on charges of violating the Ohio blue sky law.

New officials under the reorganization claim they will have assets sufficient to cover the firm's entire liabilities of $120,000. They also announce plans are being made for resumption of production some time next month.

COAST A. E. A. MAKES PROGRESS

SAN FRANCISCO, Sept. 27 — The Automotive Equipment Representatives Association, with headquarters in this city, has made substantial progress since its organization a short time ago. Manufacturers' agents on the Pacific Coast are eligible to membership. One of the main purposes of the organization is to see that sales are made exclusively to jobbers.

CREDIT MEN MEET OCT. 7

NEW YORK, Sept. 26—The second annual convention of the Automobile Financing Credit Men's Assn. will be held at Cleveland Oct. 7. Fred Weber, Jr., of the Bankers' Commercial Security Co. of New York, is president of the organization. His report will show that the 30 members of the organization have financed the sale of 300,000 motor vehicles valued at $400,000,000 in the past two years.

Deficiency Payment Extended by Senate

New Draft of Tax Bill Would Allow 18 Months to Elapse—Passage Before Nov. 1

WASHINGTON, Sept. 26—In the Senate tax bill, which Senator Penrose formally reported to the Senate to-day, there is an amendment in Section 250 of part 4 of the administrative provisions which is intended to relieve the taxpayer in case of additional assessments made without complete knowledge of all taxes in the case. The new provisions proposed by the Senate Finance Committee would extend the time for the payment of deficiencies to eighteen months from the passage of the revenue act. This change is of vital importance to the lumber industry and other branches of trade affected by the decision in the LaBelle Iron Works case.

Provides for Bond

Paragraph "F" of Section 250 makes this provision and authorizes the Commission of Internal Revenue to require taxpayers to furnish a bond with sufficient sureties conditioned upon the payment of deficiencies, in accordance with the terms of extension granted. It is provided that in lieu of other interests provided by law as a part of such deficiencies, the rate of interest on these sums shall be two-thirds of one per cent per month from the time the extension is granted, except where such other interests provided by law are in excess of interest at the rate of two-thirds of one per cent.

If the deficiency or any part of it is not paid in accordance with the terms of the extension, the treasury would be authorized to add, in lieu of other interests and penalties provided by law, the sum of 5 per cent of the deficiency and interest on the deficiency at the rate of 1 per cent per month from the time it becomes payable, in accordance with the terms of the extension. These provisions were drafted to prevent undue hardships to lumber men and others who are obliged to pay back taxes, in accordance with the Supreme Court Decision in the LaBelle case.

Passage Before Nov. 1

The Senate leaders expect to pass the tax bill before Nov. 1. It now appears that there will be a long debate on the various provisions of the House bill as amended by the Senate committee.

In the report of the majority from the Committee on Finance it was stated that the recommendation for the excess profits tax repeal was based upon a study of its inequities. It was pointed out that the excess profits tax bears less severely upon large than upon small corporations and in practice it exempts the over-capitalized corporation, penalizes business conservatism and places upon the Bureau of Internal Revenue tasks which are beyond its strength.

Will Consider How To Assist Dealers

N. A. C. C. Members to Take Up Question of Financing Them for Winter

NEW YORK, Sept. 28—The National Automobile Chamber of Commerce members' meeting at headquarters here next Thursday will be one of the most important sessions ever held by that organization, from the viewpoint of dealers. It has been decided to eliminate from the discussion such subjects as taxation and highways, important as they are, and get down to topics which are vital to the industry.

The first question which will be taken up will be, "How can manufacturers help dealers to carry cars next winter?" In the discussion various plans for financing dealers so that they can carry stocks and keep factories in production will be outlined. There will be no formal address but discussion leaders have been appointed to open the debate.

The second important problem to be taken up will be, "What can be done by manufacturers to help solve the used car problem?" Manufacturers realize as keenly as dealers that some satisfactory solution must be found for this question before the industry can be thoroughly stabilized.

Space for the annual shows at New York and Chicago will be drawn in the afternoon.

The truck manufacturers who are members of the organization will hold a session Friday, at which they will consider means of financing the motor truck distributer, prompt handling of motor truck paper by banks, and vocational selling of trucks.

Metal Trades Advance 10 Per Cent in August

MILWAUKEE, Sept. 26—The most encouraging report made within a year's time concerning the condition of business in Milwaukee and vicinity is that contained in the current issue of Business and Financial Comment, published monthly by the First Wisconsin National, Milwaukee's largest bank. The review credits the automotive industries with much of the responsibility for the improvement. It says in brief:

"The drift of business in Milwaukee may be tested by three factors—capacity of operation, number of men employed, and sales. The metal trades as a whole increased their capacity of operations about 10 per cent in the last month. For this result the automotive group was largely responsible, as will be seen from the figures of employment. Iron, steel and their products lost 1.8 per cent in number of employees, and metal products other than iron and steel lost 20.3 per cent, while the automobile, parts and accessories group gained 23.4 per cent. In the whole metal trades group sales were about 30 per cent better in August than in July, but compared with August, 1920, they were about 40 per cent smaller.

"From somewhat scattered sources of information it appears that quantity of production in Milwaukee and vicinity reached its lowest point about last April or May when operations in iron, steel and machinery were rapidly falling off and improvement in automobiles, textiles, leather and shoes had not yet made much headway. Since that time there has been a slow but steady climb in production, quickened in the last thirty days by a slightly better showing among some metal trades firms. Production as a whole is not back to that of last September, since at that time iron and steel products and automobiles had not yet slowed down appreciably. Production in September, 1920, can be estimated at about 80 per cent; the lowest point about 60 per cent, and at present about 75 per cent."

As the keynote of the current summary, the following is given: "Business moved slowly in the past month, but it was the first month in over a year in which there were no discouraging slumps. The balance for the month inclined to the favorable side. . . . People have reason to be telling one another that 'the worst is over' or that 'business is picking up some'."

British Tire Makers Feel Effects of Cuts

LONDON, Sept. 16 (*By Mail*)—The position of the British tire trade reflects the conditions prevalent in the general industry. Report is rife of tires being sold at 50 per cent less than their listed rates, with the names of the manufacturers taken off. Therefore it was not unexpected that the Leyland & Birmingham Rubber Co., one of our biggest miscellaneous rubber-making companies, should show a deficit on the year's working up to June 30 last. The amount is $100,000 (at par), whereas last year's return showed a profit of $432,000 and 15 per cent dividend was paid. In May last year the company issued 125,000 shares at a premium of nearly $2 each, which emphasizes the set-back suffered within the past few months.

New Goodyear Truck Delayed by Detours

AKRON, Sept. 27—The Goodyear multiple wheeled motor truck reached Los Angeles, Cal., on Sept. 24 on its first trans-continental run, according to word received here. The truck left Akron with a load of rubber heels, on Sept. 8, in charge of M. D. Scott.

It is the first time a multiple wheeled motor truck has been seen on the Pacific Coast. The truck made fast time from Akron to Kansas City, but encountered bad roads and long detours through New Mexico. It had been planned to reach Los Angeles by Sept. 20, the detours delaying the trip four days.

The truck's run does not come up to the record of the conventional truck for the Akron-Los Angeles run. Two years ago a four-ton Packard four-wheeled truck made the trip in eleven days and 22 hours elapsed time.

Aim to Avert Slump in Car Repair Work

Service Associations Will Spend $16,000 to Bring Business in Winter

NEW YORK, Sept. 26—Automotive Service Associations of New York and Brooklyn are preparing to spend $16,000 on an advertising and direct mail campaign to avert the usual slump in winter automobile repair work. The appeal will be carried to the car owner to have the overhauling work which usually is put off until early spring done during the winter. Brooklyn started the movement a few weeks ago and mapped out the plan. An initial appropriation of $4,000 to be secured through voluntary subscription of members was made. New York later joined the movement with a $12,000 appropriation.

The plan is to use quarter page advertisements in several daily newspapers, some morning and some evening, spreading these out so that every other day or every third day during the months of October and November one paper will carry the advertisement. No individual names will appear in this advertising, but the signature will be that of the association. The copy will be prepared especially to get the interest of the car owner and set him to thinking of the advisability of having his work done early. To follow this up and clinch the argument, there will be 50,000 folders printed in two colors, also bearing the emblem of the service association, but with the name and address of the firm that has subscribed to the fund.

The financial arrangements are such that the fund will be raised by subscriptions of $100 each. Of this amount, $25 will be paid on the signing of the contract and the balance in installments covering the ten weeks that the campaign will run. The associations will, therefore, have at all times money in the treasuries from the subscribers in advance of the time that that money will be needed.

Subscribers Benefited

Subscribers to the fund will get the general advantage of the newspaper advertising and have their names printed on the folders. Non-subscribers to the fund who are members of the association will, of course, derive some benefit from the advertising, but they will not be able to follow it up. The prestige of the associations will be advanced and membership in them will, therefore, become more valuable.

The campaign in Brooklyn is in full swing and the campaign in New York has just started. Forty teams of two men each are visiting responsible firms and asking for their subscriptions, carrying with them samples of the advertisements and folders. The first half hour of the drive resulted in six subscriptions, so the plan is evidently being favorably received.

Seiberling Shortly to Control Portage

Acceptance of Offer of $750,000 for Property Recommended by Former Officials

AKRON, OHIO, Sept. 26—Frank A. Seiberling, founder and former president of the Goodyear Tire & Rubber Co., soon expects to be in control of properties of the Portage Tire & Rubber Co. at Barberton. Control of the Portage plant will practically complete Seiberling's plans for the staging of his "come back" in the tire industry, following his resignation as Goodyear president under the refinancing and reorganization of the company several months ago. Edward G. Wilmer, representing eastern financiers, is his successor at Goodyear.

Seiberling already controls the Star Tire & Rubber Co. of Akron and the Lehigh Rubber Co. of New Castle, Pa. He is negotiating both for the Republic tire plant at Youngstown and the Marion Tire & Rubber Co. at Marion, Ohio, it is reported. Acquisition of these together with the Portage will give him a chain of small rubber companies capable of a combined production of over 10,000 tires daily.

Seiberling's offer of $750,000 for the Portage property, made before Judge C. D. Westenhaver of the Federal Court at Cleveland, is the highest offer made, and its acceptance has been recommended by deposed Portage officials and by George D. Bates, trustee of the company. The court's approval of the Seiberling offer is expected before Oct. 1. Seiberling plans to resume production immediately with a force of several hundred men and eventually to employ 1500 men in the plant.

Portage stock is carried at a book value of $2,100,000. When appraised recently its value was placed at $1,500,000. Mr. Seiberling's offer is half of the latter figure, payable in 7 per cent preferred stock, the title of the common stock to revert to the holding company to be formed.

Seiberling, it is stated, proposes to pay $750,000 in stock to the fabric creditors of the Portage company and the balance at the inventoried figure in cash to take care of other claims of creditors.

The Portage company has a capacity of 3000 casings and 2000 tubes daily.

Better Feeling Apparent at Indianapolis Plants

INDIANAPOLIS, Sept. 26—While there has been no increase in the volume of production in Indianapolis motor car plants, there has been a slight increase in the production of the accessory plants. Shock absorber, windshield device and body manufacturers are more optimistic than they were thirty days ago. They state that while orders show only a slight increase and in some instances none, there is a much better tone and inquiries are more numerous. There appears to be an easier money situation, which up to the present time has been reflected only at the banks.

Credit conditions as yet are not good, although these are expected to improve during the next thirty days. Bankers here, following the recent report of the Federal Reserve Bank, particularly the Chicago district, are in a much better frame of mind. The financial situation, they say, is not what it should be, but it has improved so much lately, they feel the worst has been passed. While no announcement has been made it is the general feeling that the interest rates will be dropped before another month or at least before the first of the year.

Receiver for Lorrain; Reorganization Likely

INDIANAPOLIS, Sept. 26—Walter S. Butler has been named as receiver for the Lorrain Car Co. of Richmond, by William A. Bond, judge of the Wayne Circuit Court, in compliance with a petition filed by D. H. Cummings, president of the company. The company manufactures motor hearses and has become financially involved as a result of the business depression. The liabilities are approximately $35,000.

The company was incorporated with a capital of $1,500,000, of which $1,000,000 was to be common stock; $150,000 first preferred stock, $350,000 to be second preferred stock. Of the common stock, $250,000 has been issued; of the first preferred stock, the entire issue has been sold and is said to be protected by customers' notes. Of the second preferred stock only a small amount has been issued.

It is said that the concern probably will be reorganized and the business taken over following an adjustment of its affairs under the receivership.

STATE DEALERS ORGANIZING

ST. LOUIS, Sept. 26 — Preliminary work for the organization of State dealer associations in Pennsylvania and New York has been completed by the National Automobile Dealers Association. Delegates from local associations in Pennsylvania will meet at Harrisburg Oct. 5 to adopt a constitution and by-laws and arrange for a State convention to be held in the Capitol building in that city in November. In New York State, delegates from local associations will meet in Syracuse about Nov. 20, when preliminary organizing steps will be taken and plans made for a general convention probably to be held in December.

ACCEPT HARPER BEAN PLAN

LONDON, Sept. 5 (*By Mail*)—Creditors of the Harper Bean interests have accepted the plan for the continuation of the company's trading. The creditors will receive at the rate of 3s. 4d. (nominally 80 cents) per £1 (nominally $5) of debt.

Ames Advises More Aircraft Research

Resumption of Scientific Activity Urged Upon Manufacturers by Aeronautic Chief

WASHINGTON, Sept. 26—Re-establishment of research laboratories maintained by aircraft manufacturers, many of whom were directly associated with the automotive industry, has been recommended by Dr. Joseph S. Ames of the National Advisory Committee for Aeronautics. In a statement to-day, Dr. Ames stated that civilian aviation demands the development of cheaper, more reliable and more efficient aircraft and that the advisory committee favors the continuous prosecution of scientific research and experimentation for the development of aircraft for any purpose. He deplored the discontinuance of this activity.

It is the contention of Dr. Ames that civilian aviation must be developed, for in the last analysis it should be the main support of the industry in time of peace. He has suggested that Congress take immediate action on the aviation bills which have been introduced, that is, for the establishment of the Bureau of Air Navigation in the Department of Commerce. Dr. Ames regards the situation as serious from the standpoint of industrial development and particularly national defense. It is his contention that the recent bombing tests of airplanes versus battleships off the Virginia capes have served to indicate the great possibilities of aircraft in coast defense and naval warfare, and to accentuate the demand for progress in aeronautical development.

Dr. Ames pointed out that in the present demand for economy in government there is danger that the development of aviation may be unwisely retarded. He stated that economy can be wisely effected only where economy is possible without retarding necessary development, and that it will be a mistake to retard the development of aviation.

Airplane Design Topic at Dayton S. A. E. Meeting

DAYTON, OHIO, Sept. 26—The Dayton section of the Society of Automotive Engineers will open its season with a meeting on Oct. 4. I. M. Laddon, chief of the airplane design branch, Engineering Division, U. S. Air Service, will give a talk on all-metal airplane construction. The meeting will be held at the Engineers' Club at Dayton, Ohio. The talk will cover internal bracing, the use of steel and duralumin as tubing, wing covering, etc. The paper will discuss advanced types of airplane design such as the Dornier Zeppelin airplane and monoplane, Junker monoplane, Fokker monoplane and biplane, Brequet and others.

Peerless Stock Up Under Transfer Deal

Rises 15 Points—Stockholders Requested to Deposit Shares Before Oct. 10

CLEVELAND, Sept. 26—The deal for the purchase of the controlling interest in the Peerless Truck & Motor Corp. of this city has reached the point where an outline of the sale has been given to stockholders of the corporation. Although negotiations were still in progress between R. H. Collins of Detroit and associates and B. G. Tremaine, president of the corporation, and his associates, notices setting forth details of purchase were sent to stockholders through the mails.

The purchase will be made on the basis set forth in previous dispatches from Cleveland. Collins and his associates are to take over 50,000 to 80,000 shares of the company and pay $50 a share. Of the purchase price $10 will be paid in cash and there will be six deferred payments totaling $40 a share. These will be in six equal installments semi-annually over a period of three years. The deferred payments will be secured by a trust agreement under which there will be deposited as security for the personal obligations of Collins and associates all of the shares sold and additional security covering the first two installments of principal. After these two installments are paid, the notice says, the only security which the stockholders will have will be the shares themselves but the amount of the indebtedness so secured will be reduced to $26.67 a share.

Recommend Acceptance

The notice, which is signed by B. G. Tremaine, president, and F. S. Terry, also an executive of Peerless, states that "we and our associates are favorable to Mr. Collins' proposition, and will recommend its acceptance to our friends. The furnishing of the minimum of 50,000 shares is therefore practically assured. Our attorneys, Mr. Tremaine and G. B. Siddall, probably will make the sale when the minimum of 50,000 shares is deposited with the Cleveland Trust Co. All stockholders who sign the agreement and deposit their shares on or before Oct. 10 will participate in the sale. Agreement and shares received later than that date will be returned."

The notice then proceeds to ask stockholders to deposit their stock in escrow with the Cleveland Trust Co. so that they may participate. This request would indicate that Tremaine and his associates have not yet obtained under proxy all of the stock that Collins and his associates desire.

Collins was in the city to-day and was in conference with officers of Peerless at the plant. The deal, which involves the payment of practically $4,000,000 is expected to be consummated shortly.

The Peerless stock sold to-day on the exchange here for 38, a rise of 15 points since the first rumors of the approaching deal were heard. When Collins takes over the management it is reported that sales promotion work will be carried on on a much larger scale than it has ever been. Every effort possible will be made to increase the prestige of the Peerless products throughout the world and it is expected that production will be increased greatly.

HORSE PROPAGANDA REFUTED IN CANADA

CHICAGO, Sept. 26—The responses received from a questionnaire sent to 5000 Canadian tractor owners by the International Harvester Co., show that tractors are being operated this year despite the many conditions unfavorable to their use. Only 15 per cent of those answering the questionnaire stated that they had not used the tractor this year.

The questionnaire was sent out in an effort to refute the propaganda of the Horse Association of America which stated that but 5 per cent of the tractors in the Canadian Northwest were in use this year, and as a result of this condition an investment of over $42,000,000 in tractors in this section was disappearing in depreciation.

First Show in China Scheduled for November

WASHINGTON, Sept. 26—Trade Commissioner Lynn W. Mekins advises manufacturers of automobile accessories and automobiles in this country to make arrangements with exporters for an exhibit of their products at the Shanghai Automobile Show, to be held during the week of Nov. 26 to Dec. 3, the first exhibit of that character ever held in China.

He points out that in order to reach Shanghai in proper time, it would be advisable to ship samples of accessories and other display material through parcel post or express by way of the Pacific. The existence of a branch of the United States Post Office at Shanghai enables parcel post shipments to be made under domestic rates and conditions. A majority of the best known American, French and British automobiles will be displayed by local representatives. A list of importers of and dealers in automobiles and automobile accessories in China may be obtained from the Bureau of Foreign and Domestic Commerce.

ADDS STANDARD EQUIPMENT

CLEVELAND, Sept. 26—The Grant Six has added as standard equipment wood disk wheels, spare cord tires, Neville sliding steering wheel, drum shaped headlamps, parking lamp on the cowl and bumpers in both front and rear.

California Trade Shows Slight Drop

Will Feel Effects of Oil Field Strike If Acute Situation Develops

LOS ANGELES, Sept. 26—The continuance of the demand in southern California for motor equipment surpasses understanding. In June, it was predicted, the peak had been reached when the 10 counties passed the 5000 mark in registrations. This seemed to be borne out when July showed a slight decline, but August followed with a gain that not only passed the previous month's figures but was more than 100 in excess of June. September probably will fall slightly behind August, but indications are that the predicted slump has been postponed for at least one more month.

Dealers and others closely identified with the trade have quit trying to guess business prospects. The air has been filled with a belief that business would have to get much worse, because of conditions in other parts of the country, but the time has not arrived, according to the figures. At the end of August there had been 33,681 new motor cars and trucks registered in southern California as against 29,375 for the same period the year previous. August reported 5384 new passenger cars, of which 2333 were Fords, and 500 trucks and commercial cars, of which 220 were Fords.

There is no doubt but that if the strike in the oil fields that now is waging brings about an acute situation, the automotive trade will feel the effects. Kern County, the heart of the oil district, is one of the most thoroughly motorized sections in the entire State, and a complete tieup in operations will paralyze all kinds of industry there. In Los Angeles County the banks that have taken over a liberal quantity of both trucks and passenger cars have begun selling them at far below the original list prices. It cannot be told at this time how serious will be the effect of this class of trade. Truck dealers are likely to feel it more than the passenger car dealers.

MAY SELL SCOUT MOTORS

LONDON, Sept. 16 (*By Mail*)—The affairs of Scout Motors, Ltd., at Salisbury, one of the oldest British automobile makers, are being revived by the court. The company, though never at the front of the industry, had a fair reputation for a mid-grade car but had a bigger market for their "Scout" trucks. The gross debts are declared at $158,770 and the assets taken at a forced sale value are valued at $50,000. The official report on the company's affairs suggests a possible sale of the company, but adds the significant remark, "the present position of the motor industry is not very favorable."

September Business Is Exceeding August

Slight Decline in Some Sections Balanced by Increases in Others

NEW YORK, Sept. 26—The feeling of confidence engendered in the automotive industry by the unexpectedly good business of the summer months is being sustained by the September sales showing and the belief that there will be no serious slump in trade in October or November.

Liquidation of high priced inventories by passenger car makers is rapidly nearing completion, and they are buying supplies at the market. There also has been a gratifying increase in the efficiency of labor. These two factors together have been responsible in no small degree for the substantial price cuts which have been made and which have been passed on to the "ultimate consumer," in marked contrast to the situation in many other lines.

There is a striking disposition throughout the industry to be mutually helpful. The parts and accessory manufacturers are fully alive to the difficulties confronting the vehicle makers and are disposed to assist them in every way possible. In respect to inventories and labor, the parts makers are in much the same position as the car manufacturers. This has been reflected in substantial reductions within the past few days in some of the most important unit parts used in assembled cars.

Business Better in South

While there has been a slight falling off in sales of passenger cars at retail in the great industrial districts, this has been balanced by increased business in the South and in the leading agricultural sections where farmers are liquidating their bank indebtedness and are replacing some worn automotive equipment. Reports of better business in the South are particularly encouraging.

It is notable that the feeling in Detroit is increasingly hopeful. Employment figures for that city show that there has been no decline in the number of men employed, although a few more are on part time. Ford production for September will run several thousand behind August, but this is not due to lack of orders but rather to manufacturing complications. Ford sales were stimulated to a marked degree by the most recent price cut, and the company has sufficient orders on hand now to keep it going at capacity until Nov. 1. Dodge, Studebaker, Buick, Nash and Reo are behind on deliveries. An indication that the companies in the higher priced class are feeling the beneficial effects of the generally brighter outlook is found in the fact that September will be the best month the Lincoln Motor Car Co. ever has had.

SMITHS LOOM LARGE AS POTENTIAL BUYERS

DETROIT, Sept. 26—Eleven and five-tenths per cent of the Smiths are buying automobiles this fall and winter.

This information was solicited by a leading farm journal by sending out a questionnaire to the 12,824 Smiths listed among its 1,100,000 subscribers. The idea of this means of getting a line on what farmers were going to do with their money suggested itself to a man named Smith in this journal's research department.

By applying the percentage of Smith car buyers to its total subscription list, the journal estimated that 126,500 cars will be purchased by its 1,100,000 readers. Of this number the questionnaire revealed that 116,200 had already determined upon the make of car they will purchase.

The entire industry is centering its attention to a greater degree than ever before on the question of service and the needs of car owners. This probably will result in fewer complaints in the future about high upkeep costs and unsatisfactory repairs.

Two Days for Next French Grand Prix

PARIS, Sept. 17 (*By Mail*)—Next year's French Grand Prix race will be a two-day event for two different types of cars. Racing cars will be run on one of the days under a piston displacement rule, but the national club is undecided whether to retain the present 183 cu. in. rule or to drop to 122 cu. in. The smaller piston displacement has a big following, but if adopted for next year, it will eliminate all foreign competition, for the 183 cu. in. rule has been decided on in England, America, Italy and Belgium. The second race will be for stock cars having minimum body dimensions and a limited amount of gasoline and oil. This event will be quite independent of the one for purely racing cars, although run over the same course. It has yet to be decided where these two races will be held. The date probably will be early in July.

E. W. BROOKS DIES SUDDENLY

CADILLAC, MICH., Sept. 27—Announcement has been received here of the sudden death in Kansas City of E. W. Brooks, field representative of the Acme Motor Truck Co. He had been factory representative of the company in the Southwestern States for three years and had just returned to Kansas City from a long business trip when he suffered a stroke of apoplexy in the lobby of his hotel.

Cotton Prices Boom Georgia Industries

Increased Employment and Bank Clearings Reflect General Improvement in Conditions

ATLANTA, Sept. 26—That there has been material improvement in business in Georgia during the past five or six weeks is indicated by a report of the State Department of Commerce and Labor issued the latter part of this month, which states that Georgia industries are now employing more persons than at any time during the past seven months. The increased price of cotton is responsible for the betterment in employment conditions, and if the price holds around the 20 cent per pound level still further improvement is anticipated during the coming month.

Material improvement is shown in employment conditions in virtually all of the southern States the past five or six weeks, or since cotton began its steady advance, according to reports received in Atlanta.

Bank clearings in Atlanta also show a large and steady increase. Clearings the third week in September were larger than any single week since last January, the increase each week amounting to several million dollars the past month.

Increase at Ford Branch

The Atlanta branch of the Ford Motor Co. reports a tremendous increase the past few weeks in Ford car and truck sales, the South leading all the other districts in the percentage of gain since the latest price reduction. The increase for the Atlanta branch has been 63 per cent, and this branch now has approximately 1000 unfilled orders on hand. A good sign of the general business improvement is the fact that there has been an enormous increase lately in the sale of Ford cars to commercial houses for the use of salesmen in covering their territories.

P. A. Megahee, secretary of the Georgia Automotive Dealers Association, has just completed a trip throughout the State, visiting the various local dealer organizations, and reports that everywhere he visited increased cotton prices have been reflected in increased automobile sales, especially among the smaller dealers. There is a much better feeling among the dealers in the smaller towns than there has been for more than a year, and their general opinion is that the industry is close to normalcy.

CITIZENS VISIT TIRE PLANT

HOLYOKE, MASS., Sept. 27—More than 5000 citizens inspected the new plant of the New England Tire & Rubber Co. at its formal dedication. The inspection was preceded by a meeting of the stockholders at which officers and directors were named. John Kearns is president of the company, C. D. Huntley, treasurer and general manager, and J. S. Bernstein, secretary.

Goodyear Production Neared Peak Volume

Wilmer, After Survey, Says Buying Is Being Done on Close Lines

AKRON, Sept. 26—Summarizing operations in the rubber industry during the past half year, following a complete survey of Goodyear properties which included trips to Canada, Arizona and California, President Edward G. Wilmer of the Goodyear Tire & Rubber Co. expresses the conviction that the foundations are being soundly laid for the future stability and progress of the industry.

"Our sales during the summer season have exceeded our expectations of last spring. There was a larger use of automobiles than we had thought there would be, compelling our production of tires to go within as high as 85 per cent of its peak volume," states Mr. Wilmer. "Part of this was due undoubtedly to the fact that there had not been the normal buying during last fall and winter. Neither consumers nor dealers did any stocking up this summer, and they are still buying carefully from hand to mouth."

Three Plants Surveyed

Mr. Wilmer's trip included surveys of the Goodyear tire plants in Toronto, Canada, and Los Angeles, Cal., and the company's cotton plantation in Arizona.

"At the Canadian plant at Toronto they have completed their readjustment to new conditions and are moving ahead. Progress is being made in the domestic field and even more encouraging progress in export," states Mr. Wilmer. "All along the Pacific Coast we found business conditions were better than in the country generally. They have felt the readjustments much less than we have in the East. I was more than pleased over the new Goodyear factory at Los Angeles. It is a wonderful plant and ideally adapted to serve its purpose. Our California factory reached a peak production of 4100 tires a day this summer. A larger volume of business that will use proportionately more of its facilities will greatly improve its showing, but already it is meeting the demands upon it, both from the standpoint of production and current earnings.

"In Arizona, where the company has its cotton plantations, I found a section of America which had gone through great reverses during last winter and spring, but which is now showing real signs of revival.

"They had in the Salt River Valley 180,000 acres in cotton last year. They had only been in the business of raising long staple cotton for three or four years, and were not prepared to carry them through a year in which the prices of their product slumped substantially under the cost of production."

Piston Displacement Values Shown by Race

BRESCIA, NORTHERN ITALY, Sept. 8 (*By Mail*)—An average of 72 miles an hour was maintained by Ernest Friedrich in to-day's 215-mile race, with a four cylinder Bugatti having a piston displacement of only 91.5 cu. in. This constitutes a world's record for cars of this size and is a higher speed than was attainable in 1914 with engines of twice this piston displacement.

The Bugatti cars, which weighed 1100 pounds, had a four cylinder motor of 68 and 100 mm. bore and stroke, with four valves in the head operated by an overhead camshaft, with vertical bevel gear drive. The crankshaft was carried in three ball bearings, and roller bearings were used for the connecting rod ends. Ignition was by a couple of high tension Bosch magnetos carried on the aluminum dash and driven from the overhead camshaft by a horizontal shaft with a couple of flexible fabric couplings.

The high speeds attained in this race, the small amount of mechanical trouble, the economy in tires, which gave such good service that they never influenced the result, and the high degree of perfection which has been attained in getting these 1100 lb. cars to hold to the road, all confirm the conviction that the 183 cu. in. limit is too high for racing purposes.

No Distributers Rumored in Willys-Overland Plan

NEW YORK, Sept. 28—Reports in circulation among wholesale and retail representatives of Willys-Overland, Inc., are to the effect that the company is about to eliminate the distributer from its plan of marketing Willys-Knight and Overland cars. It is said that dealers will operate directly under branch sales managers. Each branch will have several hundred dealers under its direction under this plan. It is reported that sales territory throughout the country will be redistributed.

Rickenbacker Acquires Former Disteel Plant

DETROIT, Sept. 26 — Rickenbacker Motor Car Co. has taken over the Disteel Wheel plant of the Detroit Pressed Steel Co. in a deal which affects four companies in the industry importantly. It is one of the first of a number of plant changes which may be expected this fall and winter, all making toward the solidification of the companies concerned.

Besides Rickenbacker and Detroit Pressed Steel, the companies in the present deal are Briggs Mfg. Co., body builders, and Everitt Bros., body painting and trimming. Everitt Bros. will consolidate its business in its East Jefferson Avenue plant, while Briggs Bros. will practically double the space occupied in its former plants.

The plant has now been sold to permit Detroit Steel Products to consolidate its manufacturing units in the Mt. Eliott Avenue plant. Each of the companies involved in the deal is already in the new plants. All of the Rickenbacker offices are now at the former Disteel plant. President B. F. Everitt said that production will be under way on all models in December though no shipments will be attempted until January.

Conservatism Marks Philadelphia Trade

Sales of Lighter Trucks and Lower Priced Automobiles Show Improvement

PHILADELPHIA, Sept. 26—Trucks, particularly those of smaller capacities and lighter construction, are having a better sale than for some time in this city and vicinity, but only under the constant spur of salesmen's contests in which prizes or bonuses figure and through readjustment of territory and increased energy on the part of sales managers. Sales of lower priced automobiles are picking up and while business is not yet on a normal basis, buying is more systematic and inquiries are more frequent. Many of the dealers are still engaged on cutting down their sales and service operating expenses. One economical step that is becoming general is the drastic cutting-down of the number of salesmen's cars and demonstration cars. It is noted that most customers who are buying cars for their personal use are more conservative.

Accessory dealers report that business, at the end of the summer, is becoming more active, yet not as active as had been hoped. Tire manufacturers in this territory report the summer sale of their products as good. While they expect a slowing up of business with the end of the summer motoring, they are optimistic as regards future trade.

Tire dealers report that there is a heavy demand at present for tires for small cars which have had big price reductions. These sizes are far outselling the larger sized tires. Companies supplying tires to automobile manufacturers in the territory, including southern New Jersey, say that they have felt the slump that affected the industry. Old debts have been paid for the most part, although collections have been slow, and the majority of companies are starting on a new basis.

LEE MAKING NEW TIRE

NEW YORK, Sept. 26—The Lee Tire & Rubber Co. is producing a new tire known as the Lee 22 Zig Zag, priced at $13.75, and suitable for Ford, Maxwell, Overland and Chevrolet cars. This figure has been fixed, the company states, in anticipation of 1922 prices.

CORRECTION

NEW YORK, Sept. 27—The statement was made in a survey of automotive conditions in Mexico, printed in AUTOMOTIVE INDUSTRIES, Sept. 1, that Messrs. B. Estades & Cia are the Pierce-Arrow distributers in Mexico City. This was an error, for the distributers of the Pierce-Arrow line in Mexico City are Compañia Automotrix Mexicana, S. A. This company has had the exclusive franchise for Pierce-Arrow in Mexico for several years.

Truck Association Closes Headquarters

Business of Chicago Organization Will Be Conducted Through Informal Meetings

CHICAGO, Sept. 27—At a meeting of the board of directors of the Motor Truck Manufacturers' Association held here, it was decided to close the association office and dispense with the services of the manager and staff. At the suggestion of B. A. Gramm, vice-president of the Gramm-Bernstein Motor Truck Co., an association member, it was decided to continue the activities of the organization through the medium of occasional meetings of such members as may remain in the association.

The reasons given for the closing of headquarters and the virtual dissolution of the association are that the present state of the motor truck industry does not justify the expense of office and staff, and the lack of financial support from its members.

The Motor Truck Manufacturers Association was organized in April, 1918, for the purpose of ready exchange of parts among manufacturers under contract with the government to build army type B trucks. Later the activities of the organization were broadened to cover such points as legislation and general expansion of the industry. The association started with 14 members. This number was raised to 55 but dropped to 31. David Thomas has been manager of the association since its organization.

Hupp Changes Prices on Enclosed Models

DETROIT, Sept. 27—Hupp Motor Car Corp. has reduced prices on its enclosed car models to $2,250 and $2,200 for the sedan and coupe respectively. The former prices were $2,285 and $2,400. No changes are made in the models, the lower prices being effected through manufacturing economies. The price of the open models, $1,485 for touring and roadster, remains unchanged.

KISSEL TRUCKS DOWN

HARTFORD, WIS., Sept. 26—Reductions ranging from $600 to $1,000 on its line of trucks are announced by the Kissel Motor Car Co. The prices follow:

	New Price	Old Price
Utility model 1½ ton....	$1,975	$2,775
Freighter model 2½ ton.	2,875	3,475
Heavy duty model 4 ton	3,675	4,475
Goliath model 5 ton.....	4,085	5,085

ANOTHER CUT BY ANDERSON

ROCK HILL, S. C., Sept. 26—The Anderson Motor Car Co. announces another cut in prices on its various models. It covers the new line which is now being turned out. Economies in manufacturing and distribution have made the cut possible. The price list follows:

	New Price	Old Price
5 passenger touring..	$1,650	$1,795
7 passenger touring..	1,795	1,845
Coupe	2,450	2,795
Sedan	2,550	2,795

No change has been made in the price of the two passenger speedster which remains at $2,195.

SAXON MAKES CUT

DETROIT, Sept. 26—The following price reductions are announced by the Saxon Motor Car Corp.:

	Old	New
2 passenger roadster.....	$1,545	$1,345
5 passenger touring.....	1,495	1,295
Coupe	2,295	1,995
Sedan	2,295	1,995

R. & V. KNIGHT REDUCES

EAST MOLINE, ILL., Sept. 27—Reductions have been made on the R. & V. Knight, Model R, as follows:

	Old	New
5 passenger.....	$2,150	$1,500
Coupe	2,850	2,650
Sedan	2,950	2,750

STEPHENS SALIENT SIX DROPS

FREEPORT, ILL., Sept. 27—The Moline Plow Co. has announced that the Stephens Motor Works has reduced prices on the Stephens Salient Six, effective Oct. 1, as follows, all prices f.o.b. this city:

	New Price	Old Price
6 passenger touring..	$1,850	$2,065
4 passenger touring..	1,850	1,985
Sedan	2,850	3,100
Sedanette	2,850	3,100
Roadster	1,800	1,900
Special sport model...	1,950	2,085
Special roadster.....	1,900	2,000

RESUME REPUBLIC DIVIDENDS

NEW YORK, Sept. 29—Dividend payments on the preferred stock of the Republic Motor Truck Corp., which is controlled by John N. Willys, have been resumed. The quarterly payment due July 1 was passed. The current dividend of 1¾ per cent is payable Oct. 1. Shipments from the Republic factory this month will aggregate 200 trucks and sales next month are expected to exceed this total. This is regarded as indicating a much better trend in the truck market.

FARMERS AWAIT REDUCTIONS

KANSAS CITY, Sept. 27—The implement trade has suffered more than any other in the past year. Reports indicate that farmers are not yet ready to buy, though their credit is such that now they may enter the obligations. It is said that farmers still believe that implement prices have not been readjusted.

Reports that a further readjustment of prices may be expected in October have aroused discussion as to steps which may be taken to bring about a revival of demand.

Durant Is Producing at Long Island Plant

Scheduled Output Set at 50 to 60 Cars Daily—Will Be Increased

NEW YORK, Sept. 29—The Durant Four now is in production at the Long Island City plant and the scheduled output for next week is between 50 and 60 cars a day. Production will be steadily increased. The automatic machinery has been placed and the company contends that a record has been made in getting an entirely new car into production in seven months. Production in the Lansing plant will begin about Nov. 1. The output for the year at the Long Island City plant will be between 4000 and 5000 cars.

Durant Motors, Inc., has been informed by the Illinois Securities Commission that it will not be permitted to sell stock in that State on the ground that its securities are "purely promotional and without basis of value." A statement issued by Carroll Downs, vice-president of Durant Motors, states that the attorneys for the corporation advised several months ago that under the Illinois law as it then stood any stock which was listed in the larger stock exchanges of the country was eligible for sale in Illinois. Sale of Durant stock then began but the Illinois law was amended so that admission to the stock exchanges did not make securities eligible in that State. When this amendment was called to the attention of the company sale of the stock was suspended.

Gear Manufacturers Meet in Rochester

NEW YORK, Sept. 28—The semi-annual fall meeting of the American Gear Manufacturers Association will be held in the Powers Hotel, Rochester, Oct. 13, 14 and 15. Reports will be presented by the various committees on standardization. The program will include papers on "Gear Tooth Wear," by S. O. White, chief engineer of the Warner Gear Co., Muncie, Ind.; "Duralumin as a Material for Worm and Other Gearing," by R. W. Daniels, Bausch Machine Tool Co., Springfield, Mass.; "The Grinding of Gear Teeth and Its Future in the Industry," by J. F. Barr, secretary, The Gear Grinding Machine Co., Detroit, Mich.; "Tooth Forms," by E. W. Miller, chief engineer, Fellows Gear Shaper Co., Springfield, Vt.

Arthur E. Sutherland, former justice of the Supreme Court of New York will be one of the speakers at the informal dinner on the evening of Oct. 14. His subject will be "Capital and Labor." Another speaker at the dinner will be Ernest Paviour, who will talk on "Advertising."

Big Automotive Merger Proposed

Several Companies Will Be Included

Creditors of Jackson Motors Hear of Plan—Combine Involves $50,000,000

NEW YORK, Sept. 29 — Creditors of the Jackson Motors Corp. will have presented to them at a meeting in Jackson, Mich., to-day a proposal that they sanction entrance of that company into a $50,000,000 merger of automotive concerns. The plan has been worked out in detail after months of effort by the bankers involved, headed by Ralph Van Vechten, of the Continental and Commercial Bank of Chicago.

Details of the negotiations for the consolidation have been kept a close secret, but it is understood that the companies which will be taken in will include the Traffic Truck Co., the Covert Gear Co. and the Herschell-Spillman Co. Efforts were made some time ago to interest in the plan the interests which control the National Motor Car and Vehicle Corp. of Indianapolis, the Liberty Motor Car Co. of Detroit and the Cole Motor Car Co. of Indianapolis, but these corporations decline to enter the combination.

It is understood also that negotiations have been under way with the Mitchell Motor Co., Inc., of Racine, Wis., and the Gardner Motor Car Co., Inc., of St. Louis. Bankers closely connected with the Mitchell company said to-day that they had heard nothing of any plan of entering such a merger. The interests which control the Mitchell company are identical with those back of the Hupp Motor Car Corp. but there has been no intimation that Hupp was in any way interested in the merger.

C. O. Miniger, who is president of the Electric Auto Lite Corp., a subsidiary of the Willys Corp., is a director of Jackson Motors but it was said here to-day that there was not the slightest possibility of Electric Auto Lite being included. So far as the Willys interests were concerned, it was said, the connection of Miniger with Jackson Motors was merely a coincidence.

While it has been known in banking circles for some time that efforts were being made to form a big combination, little has been heard of it in the trade. Probably the most active workers for it have been Van Vechten, Harold Plimpton, a Boston broker, who is a member of the Jackson finance committee, and Carl L. V. Exselsen, a Chicago attorney. Exselsen is secretary and treasurer of the Jackson company.

The call sent to creditors of Jackson Motors for the meeting at Jackson to-day, says:

"Very earnest and active work has been done during the past two months preparing a satisfactory solution of Jackson Motors problems. The plans evolved are about to be consummated and the general plan of the entry of Jackson Motors into the merger will be disclosed and acted upon."

The creditors had been informed a few days earlier that under this plan Jackson would become a unit of a $50,000,000 automotive merger which would be announced about Oct. 1. The executive committee of bankers and others interested has definitely agreed to pay part of the claims against Jackson in cash if the plan is approved.

It is understood that the Covert Gear Co. is one of the largest creditors of Jackson Motors and it has been understood that plans have been under way for a refinancing of the gear company.

Jackson Motors Corp. was incorporated in 1919 to take over the Jackson Motor & Mfg. Co., the United Four Wheel Drive Truck Corp. and the Lamson Truck & Tractor Co. The plant at Jackson covers almost six acres of floor space. It makes a full line of passenger cars and also four wheel drive trucks. The authorized capital is $3,000,000 common and $2,000,000 preferred. A general balance sheet of Juy, 1920, showed assets of $6,212,742 and working capital of $1,259,743.

The Herschell-Spillman Motor Co. has a large plant at North Tonawanda, N. Y., and manufactures two types of motors, one a four cylinder for automobiles, light trucks and small tractors and the other a six cylinder for high class automobiles.

The Covert Gear plant is located at Lockport, N. Y., and the company manufactures transmission gears. Alvin A. Gloetzner, the president, is understood to have been prominent in promoting the merger.

The plant of the Traffic Truck Co. is in St. Louis.

UNDERWRITERS MEET OCT. 3

CHICAGO, Sept 26—The Automobile Council of the Underwriters Laboratories will meet at the Chicago office of the Laboratories Oct. 3, the day before the meeting of the rates committee of the National Automobile Underwriters Conference.

Possible increases in the present standards of the laboratories covering test requirements for automobile bumpers and consideration of a possible grading of automobile locking devices with reference to their merits are among the questions expected to be discussed.

Tire Standardization Report Is Completed

S. A. E. Committee and Rubber Association Have Approved Recommendations

NEW YORK, Sept. 27—The special committee on tire and rim standardization of the Society of Automotive Engineers appointed last December to consider the standardization of tires and rims, has completed its report relating to policy so far as co-operation of the society with the National Automobile Chamber of Commerce and the Rubber Association of America is concerned, and will present its recommendations at the January meeting of the standards committee of the society. The recommendations will then be presented to the society as a whole for action. They have already been approved by the rubber association.

Pending for Year

At a meeting in Cleveland last year, the decision was reached to appoint a special committee to act in this matter, and subsequently in December, 1920, the council of the society appointed J. G. Vincent, vice-president of engineering of the Packard Motor Car Co.; H. H. Rice of the National Automobile Chamber of Commerce; A. L. Viles representing the Rubber Association of America, and H. M. Crane, also representing the S. A. E., to survey the present practice. The result of the consideration of all questions pertaining to the matter is embodied in the report. If this report is adopted by the society, it will be entered in the official handbook as "S. A. E. Best Recommended Practice," instead of "S. A. E. Standard," as is now the case, the change being due to the alterations in the existing table.

New Sizes

Three present sizes would be eliminated, 32 x 3½, 33 x 4, 33 x 4½ straight side with the substitution of a 30 x 3½ clincher and 30 x 3½ straight side type, with a 31 x 4 oversize and no regular. The sizes to be recommended as the best practice are as follows:

Rim Size	Tire Size: Regular Size	Tire Size: Oversize
30 x 3½ C	30 x 3½	31 x 4
30 x 3½ SS	.....	31 x 4
32 x 4	32 x 4	33 x 4½
32 x 4½	32 x 4½	33 x 5
34 x 4½	34 x 4½	35 x 5
34 x 5	34 x 5	36 x 6
36 x 6	36 x 6	38 x 7
38 x 7	38 x 7	40 x 8
40 x 8	40 x 8	42 x 9
44 x 10	44 x 10	.....

INDUSTRIAL NOTES

Victor Bearings Co., Indianapolis, has acquired all the resources and liabilities of the Modern Die & Tool Co. of that city.

Franklin automobile shipments from the Syracuse factory for the first three weeks of September were over 10 per cent in excess of the same period in August.

Kelly-Springfield Tire Co. plant at Wooster, Ohio, will close down entirely before Oct. 1 and the machinery will be shipped to the new plant at Cumberland, Md.

The American Motors Export Co. will begin work on the initial unit of its plant at Jacksonville, Fla., with the arrival of the first carload of steel, now being shipped from the Virginia Bridge & Iron Works of Roanoke, Va.

The Oshkosh Motor Truck Co. of Oshkosh, Wis., which completed a new plant costing about $275,000 several months ago, is now in active production. The pumpers on the fire engines will be made in sizes having a capacity of 750 to 1000 gal. per minute.

Durant Motors, Inc., has made a contract with Kensley, Millbourne & Co., Ltd., 90 West Street, New York, to handle all its export business. The parent company is referring to the export house all inquiries in regard to shipments of cars to foreign countries.

Wilson Tire & Rubber Co. plant at Springfield, Ill., has been sold for $12,226.40 at a public auction in foreclosure of a mortgage on the property held by the First Trust and Savings Bank. The purchaser was James A. Easly. It is estimated the plant is worth at least $200,000.

Charles H. Harris, Inc., dealing exclusively in glass for automobile windshields and enclosed bodies, has completed its factory at Norwalk, Conn., and anticipates operating on full time in the next thirty days. This full capacity is possible through the increased business of the last six weeks.

Schoitz Tool, Gear & Machine Works, Inc., Waterloo, Ia., has added $10,000 worth of new machinery for a service to automobile and garage owners in cylinder and crank shaft grinding. The firm will manufacture and market a device for hauling disabled cars to repair shops, an invention by O. A. Schoitz, manager and principal stockholder of the company.

The Standard Unit Parts Corp., Chicago, has established a branch house in Milwaukee under the management of W. F. Mark. The company is distributer of Continental motor parts, Borg & Beck clutches, Spicer universal joints, Pierce governors and Hy Duty fans. Of the $100,000 of authorized capitalization, the Wisconsin investment is given as $15,000 in the application for a local charter.

The Oshkosh Tractor Co., Oshkosh, Wis., has called for bids for the general construction work on its new $250,000 factory, including concrete and mason work, structural steel, metal sash, etc. The main building will be 150 x 500 ft., one story, with sawtooth roof, and is expected to be ready about Dec. 1 or 15. The transfer of the machinery, equipment and materials from La Crosse, Wis., is now under way.

The Victor Bearings Co., Indianapolis, with a capital stock of $300,000, has taken over the properties of the Modern Die & Tool Co. of that city. The company will engage in the manufacture of bearings for automobiles, trucks, racing cars and airplanes. At the present time it is operating both day and night shifts. It is planned soon to move the entire plant to a new building that is to be erected near the site of the old.

The Western Reserve Mills Co. of Kent, Ohio, which recently purchased the Quitman Cotton Mills at Quitman, Ga., for the manufacture of fabric used in making tires by the Mason Tire & Rubber Co., has also purchased the Millen Cotton Mills at Millen, Ga., for the same purpose. The freight rates to Ohio were so large that the company purchased these mills outright and will manufacture the fabric right in the cotton growing belt.

The Mason Tire & Rubber Co. at Akron announces that the capacity of the tire department will be doubled by the first of the year. Contracts for the installation of new machinery to provide for the increased production have been let. Alterations in the factory arrangements will take care of the increased production. With the new machinery installed the company will have a capacity for 4000 tires and the same number of tubes a day.

Duty Motor Truck Co. will be given a deed to a tract of land at Elgin, Ill., by the local association of commerce as soon as it removes its plant from Greenville, Ill., and is in actual operation. The association paid $7,500 for the property and 150 residents of the city have invested in stock of the company. It is expected that the company, which agreed to locate at Elgin if a suitable site was provided, will have its plant completed by spring.

The Perfection Hoist & Engine Co. of Milwaukee, which is moving its plant and headquarters to Two Rivers, Wis., has made a unique departure in the design and production of the self-contained electro-generating unit which it is manufacturing. The Perfection lighting plant is powered with a four-cylinder L-type motor, air-cooled, and the piston rings, connecting rods, valves, springs, tappets, etc., are duplicates of Ford parts, making it convenient and economical for the owner at distant points from the source of supply to make immediate replacement.

The Talbott Rubber Co., Springfield, Ohio, has made application for incorporation papers with capital stock of $50,000 preferred and 500 shares of no par common. The capital has all been paid in. The company will be a distributing organization and will be strictly a dealers' proposition. It has already closed a deal with the Cleveland Rubber Corp. by which the latter will make special fibre and cord tires for it, starting production Oct. 10. The temporary officers are Frank R. Talbott, formerly treasurer and general manager of the Victor Rubber Co., president; J. W. Culley, vice-president; C. A. Crummel, treasurer; R. S. Lucas, secretary. The directors, in addition, include Roger Houston, Dr. C. C. Craig and George A. Talbott.

VICTOR RUBBER STRONG

SPRINGFIELD, OHIO, Sept. 27—President H. S. Berlin of the Victor Rubber Co. announced this afternoon that the company during the months of July and August earned a profit of $62,030 and in addition set aside $36,781 as a reserve for unanticipated contingencies. The company has doubled its sales agencies and is preparing for an extensive sales program in 1922. Berlin states that he expects 1922 to be the most profitable year in the history of the company.

Unemployment Needs Before Conference

Mayor Couzens of Detroit Is Expected to Act as Spokesman of Industry

WASHINGTON, Sept. 28—While no specific proposals regarding unemployment in the automotive industry have been submitted to the Unemployment Conference, it is expected that the subject will come up later in the discussions when the broad principles of the meeting are formulated. Of interest to the industry is the salutary effect the conference has exercised on legislative programs of Congress.

Simultaneously with the recommendation of the committee on public works of the conference, for Federal, State and municipal co-operation in road building and other public activity, it was announced that the House would make it a point to dispose of the pending highway bill immediately on convening next week. The National Automobile Chamber of Commerce and other automobile organizations have endeavored to show the conference the need of new highways and the effect their construction would have on employment conditions.

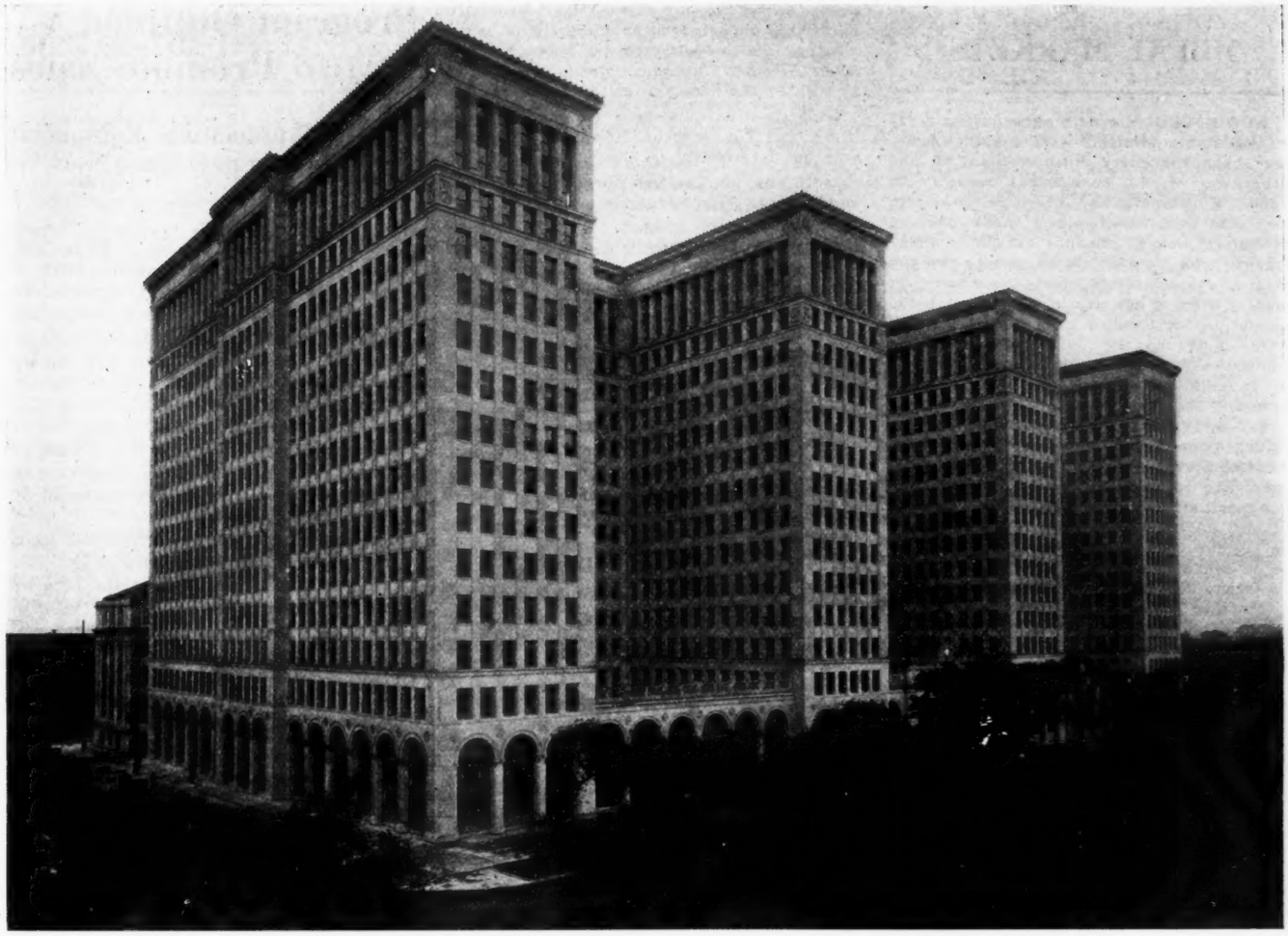
Although Mayor James Couzens of Detroit was selected as a member of the conference primarily for geographical reasons, it appears that much is expected of him as a spokesman for the automotive industry. Because of the fact that he represents the great automobile manufacturing center, it is reasonable to believe that his advice will be taken on matters relating to the trade. Many automobile manufacturers conferred with the Mayor before he came here. He is a member of the Committee on Unemployment Statistics and the Committee on Emergency State and Municipal Measures and Public Works. In the formal call for the conference the Department of Commerce erroneously listed Couzens as vice-president of the Ford Motor Co.

CREDITORS EXTEND TIME

PHILADELPHIA, Sept. 28—A majority of the creditors of the Storage Battery & Appliance Co. of Ohio agreed at a meeting here to grant the company an extension of 12 months and a committee was appointed to make recommendations for future action. Operations at the factory will be continued.

PLAN PETROLEUM MEETING

NEW YORK, Sept. 28—The directors of the American Petroleum Institute have tentatively decided to hold the second annual meeting at Kansas City, Nov. 15, 16 and 17, provided satisfactory arrangements can be made to insure adequate accommodations for members.. The annual meeting last year was held in Washington.



General Motors' vote of confidence in Detroit as automotive center of world

Offices of G. M. C. Largest of Kind

Mammoth Detroit Structure Will Likewise House Representatives of Parts Makers

DETROIT, Sept. 26—Plans for centralization of control of the many interests of General Motors have been brought to perfection at a time almost coincident with the final construction details of its immense general office building, declared to be the largest office building of its kind in the world and the peer of all buildings devoted to the needs of any one industry.

All but two of its fifteen stories will be occupied by the executive and general offices of the corporation. Executive committee and operating committee meetings will be held in these offices at monthly and semi-monthly intervals. Special directors' offices will closet director meetings on such occasions as these are held in Detroit. The main floor will display the automobiles, trucks and tractors made by the companies comprising the corporation.

The second and third floors will be leased to representatives of manufacturers making parts and accessories for the industry, thus making the building, in a larger sense, the automotive center of the world rather than exclusively General Motors headquarters.

A large auditorium in the rear will be used for the larger functions of the corporation, and will also be available to the industry as a whole and to the city of Detroit, as an exposition hall.

The building occupies two entire city blocks, practically at the intersection of the two main thoroughfares, Grand Boulevard and Woodward Avenue. It is in the geographical center of the city at a point where eventually, it is thought, will be the greatest business center.

BULLETIN FOR N. A. C. C. MEMBERS

NEW YORK, Sept. 27—The National Automobile Chamber of Commerce has begun sending to its members a weekly bulletin summarizing briefly conditions in the basic industries together with information covering employment, building, foreign trade, banking and commodity prices. It includes a survey of retail trade as compiled by Bradstreet and a chart showing the factors in motor car use compared with bank clearings and the production of pig iron. The first of these bulletins is based upon the statement that "basic industries are gradually gaining momentum."

Plan Removes Most of Moline Plow Debt

Old Securities Will Be Exchanged for New Leaving Indebtedness Less Than $3,000,000

CHICAGO, Sept. 26—The new reorganization plan for the Moline Plow Co. was made public here yesterday by Frank O. Wetmore, president of the First National Bank and chairman of the bankers' and creditors' committee of the company. The plan provides that all debts of the company, amounting to slightly less than $25,000,000 with interest be discharged with 50 per cent of bonds, 50 per cent of first preferred stock and a bonus of common in a new company.

Until the majority of the creditors act favorably upon the plan it cannot become operative. There may be some slight changes in detail.

Without assessment the old securities will be exchanged for new, of which there will be authorized $12,500,000 first preferred, $7,500,000 second and 200,000 shares of no par value common.

If this plan works out the company will be left with debts of not more than $3,000,000. It will have a large working capital.

METAL MARKETS

UNDOUBTEDLY orders aggregating a respectable tonnage were placed on the order books of sheet mills previous to the withdrawal of the concessions recently in vogue. Consumers had been posted as to what was contemplated and many covered themselves well in advance at the formerly current price levels. With sheets to the front as the leading steel commodity in point of market activity, producers of those descriptions of finished steel which are still conspicuously in the doldrums are asking themselves whether it might not be advisable to emulate the example of the sheet makers. This would imply a cutting of prices, and then, once the momentum of revived demand begins to show, the issuing of notice that the concessions would be abrogated in a few days so as to afford buyers an opportunity to place orders while prices are still an inducement. There is no doubt that in the case of quite a few sheet mills the prices at which they booked orders a few weeks ago represented cost or even below cost. These same prices, however, in an operation of 60 per cent of plant capacity may yield a small margin of profit where they resulted in positive loss when operations were on a 20 per cent of capacity basis. With a view to raising their rate of operations producers of finished steel other than sheets are considering the advisability of temporary price cuts. In fact, next to the further price reductions that would be made possible by an early scaling down of freight rates, no other factor looms so big as an incentive to downward revision as the eagerness of all producers to bring a greater part of their capacity into active operation. It is generally conceded by the steel industry that the war has left it over-equipped. Until a revival in export demand absorbs a greater tonnage of steel, there is bound to be in evidence in the domestic market a certain amount of potential selling pressure resulting from the surplus of mechanical equipment over that which the domestic demand calls for. By this it is not meant to imply that there are any large tonnages of steel pressing on the market at this time. The surplus equipment referred to is, in fact, idle. Nor are these observations to be construed as in any way running counter to the opinion which is held in many quarters and for which there is ample justification that, taking into consideration prevailing prices for labor, freight and other items that enter into steel making, the market is far more in buyers' favor than in that of producers.

Pig Iron.—Automotive foundries are inquiring for somewhat larger tonnages. Sellers appear unwilling to accept commitments for first quarter 1922. The market generally may be characterized as firm.

Steel.—Somewhat more interest is being shown by automotive consumers in alloy steels, which have been almost dormant for a long while. The old 2.50c. quotation in the cold-finished steel market has disappeared, and producers seem eager for orders at $2 to $3 below this level. Automotive consumers continue to be the best customers which the strip-steel market has. Fair-sized lots of cold-rolled are inquired for, to be shipped in October. The asking price for the cold-rolled is 3.75c. and for the hot-rolled 2.15c., but these prices are being shaded down to 3.50c. and 2.15c, respectively. Automobile sheets are in good demand at 4.35c. for No. 22 gage.

Aluminum.—Prices on imported ingot metal are being slashed merrily and offers at as low as 17c. for 98 to 99 per cent pure have been reported, although there is doubt whether deliveries would be made at this level. German aluminum sheets are offered at 30@32c. for flats and coils.

Copper.—Brass interests are buying more liberally. The market, however, continues only barely steady.

Tin.—The market has turned firmer but, as far as concerns buying by consumers, dull.

Lead.—Supplies of spot lead available in the East are light and the demand from consumers other than battery makers is keeping up well.

Zinc.—As the result of better inquiry from galvanizers, the market's general tone has improved. Production is still being curtailed and, as a result, steadiness prevails.

FINANCIAL NOTES

Goodyear Tire & Rubber Co. 8 per cent twenty-year sinking fund bonds to the amount of $750,000 will be retired Nov. 1, as provided for in the indenture. The total issue is $30,000,000.

Wilton Tool Co., Detroit, is issuing $250,000 in 8 per cent cumulative preferred stock to provide capital for expansion. Wilton Tool Co. combines the businesses of the Wilton Tool & Mfg. Co., the Twentieth Century Heat Treating Co. and the Wilton Engineering Co.

McGraw Tire & Rubber Co. shows net earnings for August of $109,000, against $33,000 for July, $20,000 for June and deficits of $10,000 in May and $40,000 in April.

Chalmers Motor Corp. 6 per cent notes due Oct. 1, 1922, totaling $33,684.80, have been sold at public auction at 50 cents on the dollar, or $16,842.40.

General Motors Corp. directors at a meeting in New York declared a dividend of 25 cents a share on the common stock, $1.50 on the 6 per cent preferred, $1.50 on the 6 per cent debentures and $1.75 on the 7 per cent debentures, payable Nov. 1.

Kelsey Wheel Co. has declared the regular quarterly dividend of 1¾% on the preferred stock, payable Nov. 1 to stock of record Oct. 20.

Reynolds Spring Co., Jackson, Mich., has declared a dividend of 1¾ per cent on its preferred Class A stock, payable, Sept. 30.

Kess-Line to Occupy Liberty Car Plant Oct. 1

DETROIT, Sept. 26—Kess-Line Motors, an offspring of the Kessler Motor Co., will take possession of the former Liberty Motor Car Co. plant here on Oct. 1, and will prepare for the production of the Kess-Line eight, which will be introduced at the national automobile shows in January.

The factory will afford 70,000 ft. of manufacturing space and will have a production capacity of 60 cars a day. It is located on the Detroit Terminal line, and is well planned for automobile manufacture. Officers of the company are M. C. Kessler, president; W. H. Radford, vice-president, and H. H. Scott, secretary and treasurer. Kessler is president of Kessler motors, Radford an executive prominent in car manufacture since 1903, and Scott a former executive of the Fisher Body Co.

Program Outlined to Promote Sales

Eastern Automotive Equipment Men Meet to Discuss Promotion

NEW YORK, Sept. 26—A sales promotion program to supplement that of the Automotive Equipment Association was authorized here by the Eastern Automotive Equipment Association. Members along the Atlantic seaboard States from Maine to Maryland were represented at a meeting and reviewed the plan of a 4-page merchandising letter which will be sent out in the name of the association to a list of dealers and garagemen in the territory covered by the members.

The letter, which is illustrated, tells of the opportunity for profit in the sale of automotive equipment, tells how to sell it and shows helps in the way of display boards and advertising material which dealers can obtain from the manufacturers through the jobbers.

The association voted to hold its annual meeting in New York on Tuesday of show week, when the following nominations for officers and directors will be voted upon: President, H. M. Savage, Whetmore-Savage Co., Boston; vice-president, G. N. Shafer, W. E. Pruden Hardware Co., New York City; secretary, T. B. O'Neill, Martin-Evans Co., Brooklyn; treasurer, Bernard Miller, Economy Auto Supply Co., Newark; directors, F. J. Murray, Post & Lester, Boston; George B. Shearer, Gaul, Derr & Shearer Co., Philadelphia; E. T. Ball, Joseph Straus & Co., Buffalo; R. J. Cahall, Cahall Motor Supply Co., Philadelphia; Wallace D. Page, American Motor Equipment Co., Boston; E. T. Satchel, Motor Accessories Co., Allentown, Pa.; J. R. Hunt, of the J. R. Hunt Automotive Supply Co., Baltimore.

JACKMAN MOTORS AUCTIONED

JOLIET, ILL., Sept. 26—The stock and fixtures of the Jackman Motor Co. of this city have been sold at public auction, following the recent action of the courts in declaring the concern bankrupt. A schedule of the company's assets indicated approximately $100,000, while the liabilities total $130,000. The creditors include the Joliet National Bank, Will County National Bank, the Industrial Acceptance Corp. of Chicago, and a number of local firms. It is expected that the business will be concluded in the near future and that the claims will be satisfied, probably at 50 cents on the dollar, governed largely by the court costs.

SAYERS SIX LOWER

CINCINNATI, Sept. 27—Sayers & Scoville Co. has reduced prices on its roadster and five passenger touring car from $1,945 to $1,795.

MEN OF THE INDUSTRY

A. J. Banta has taken charge of the plant of the Clydesdale Motor Truck Co. as vice-president and general manager. He formerly was connected with the Locomobile, Maxwell and Premier companies.

Charles S. Turner has been appointed to the sales organization of Liberty Motor Car Co. For the past five years he has been connected with Robertson-Cole Co., New York, in foreign sales development.

Frank E. Knickerbocker, formerly in charge of the Flint branch of Samson Tractor Co., is in charge of a new factory branch of Oldsmobile in Lansing, Mich. From this branch also **J. W. Rapley** will handle general distribution in Michigan.

F. A. Petrie, assistant sales manager of Dort Motor Car Co., Flint, has resigned to become vice-president of the Mission Motor Co., Los Angeles, southern California distributors of Dort. He will handle the wholesale end of the business.

Bert Hunt of William Hunt & Co., Johannesburg, South Africa, is on the way to the United States to confer with manufacturers whom he represents. William Hunt & Co. distributes the Chevrolet and the Indian motorcycle in South Africa.

Hugo C. Gibson, formerly chief engineer for the R. & V. Motor Co., is at present active in placing upon the market a number of novel improvements in the automotive field ranging from the chassis to the lighting system. This he is doing in addition to his automotive consulting work.

W. B. Clowes, assistant sales manager for a number of years with the Eisemann Magneto Corp., has severed his connection with that company. He has not stated his future plans. **O. S. Stanley,** formerly assistant service manager in New York City of the American Bosch Magneto Corp. succeeds Clowes.

Jay Dewey has been appointed Pacific coast sales manager of the George W. Davis Motor Car Co., with headquarters at Los Angeles. Dewey has been identified with the automotive industry for many years and resigns the position of general sales manager for the Lexington Motor Co. to accept the new appointment.

R. A. Wilson, production manager of the Leach Motor Car Co. of Los Angeles, Cal., is in eastern manufacturing centers on an extensive buying trip. Raw materials are being purchased as well as a large amount of machinery for the motor plant. Mr. Wilson plans to visit automobile manufacturing centers at Detroit, Indianapolis, Rochester and Buffalo before returning, about Nov. 1.

Walter E. Myers, president of the Denman-Myers Cord Tire Co. of Cleveland, will arrive in New York on the Empress of India on Sept. 29. Myers has been in Europe since Aug. 13, when he went to attend the Ecumenical Conference in London. For some weeks prior to the conference and since the conference Myers visited various parts of Europe to make a study of business conditions, particularly as they related to the rubber industry.

Forrest P. Richardson, purchasing agent of the Leach Biltwell Motor Car Co. of Los Angeles, has been appointed assistant general manager of that company. Richardson, who also is a director of the Leach Co., has been connected with the concern for more than two years and with Leach was one of the founders of the enterprise, which now is a $5,000,000 corporation and equipped to produce approximately 1200 cars a year. The company is in full production, having several months orders ahead.

R. A. Picard, for several years sales manager of A. J. Picard & Co., automotive equipment jobber in New York, has resigned to become sales manager of the Metal Stamping Co., Long Island City. Picard has been active in association work in the jobber field, having been secretary of the standardization committee of the Automotive Equipment Association and secretary of the Eastern Automotive Equipment Association. He served in the World War as an officer in the Motor Transport Corps.

W. T. Bush has been named director of sales for Gray-Dort Motors, Ltd., Chatham, Ont., to succeed **W. G. Bell,** who has taken up other work in the organization. Bush was at one time general sales manager in Canada of the Studebaker Corp. of Walkerville. Later he was transferred to the head office at South Bend as assistant general sales manager, still retaining his connection in the Canadian organization. Prior to his appointment with the Gray-Dort company he held an important executive position with the Packard Motor Car Co. of Detroit.

J. H. McDuffee, long identified with the motor car industry, will become assistant general manager of the Cole Motor Co., Indianapolis, Oct. 1. McDuffee has been with the industry almost since its first beginnings, his first connection being with the Locomobile in New York. Later he was associated with the Willys-Overland Corp. as assistant general sales manager, and president of the Chicago Subsidiary Corp. Three years ago he went to Indianapolis with Carl G. Fisher, owner of the Indianapolis Motor Speedway, and since then has been connected with Fisher.

George Shortmeier, formerly New York manager for the Madison Rubber Co. and later district manager at New York for the Sinclair Oil Co., has succeeded O. S. Stanley as manager of the branch of the American Bosch Magneto Corp. in that city. **Charles L. Shedd** has been appointed manager of the Detroit branch in the place of **Roy Davey,** who has been made manager of the manufacturing sales department at Springfield, Mass. Shedd at one time was promotion manager of the truck division of the Packard Motor Car Co. at Detroit and subsequently served as distributer for that company at Omaha. Recently he acted as sales manager of the Republic Truck Corp. at New York.

JACKSON LOWERS PRICES

JACKSON, MICH., Sept. 26 — The Jackson Motors Corp. has made the following reductions:

	Old	New
4 passenger touring	$2,685	$2,285
5 passenger touring	1,950	1,635
Coupe	3,750	2,985
Sedan	3,750	2,985

NEW PRICES FOR ATTERBURY

BUFFALO, Sept. 26—The Atterbury Motor Car Co. of Buffalo announces new prices on its various truck models, effective Oct. 1. The prices are f.o.b. Buffalo and do not include the United States war tax. The prices are:

	New Price	Old Price
1½ ton	$2,475	$2,775
2½ ton	3,175	3,375
3½ ton	3,975	4,175
5 ton	4,975	5,575

Used Car Methods Menace to Industry

Allowances Threatening Not Only to Dealer but Also to Manufacturer, Reeves Says

NEW YORK, Sept. 28—The real menace to the automotive industry is the unscientific way in which used cars are handled, is the opinion of Alfred Reeves, general manager of the National Automobile Chamber of Commerce. In an address before the Automobile Dealers Association of New York he declared that "it threatens not only the prosperity of the dealer but through him the stability and standing of the manufacturer."

"It is not alone the dealer's problem and efforts to better it should be made by the manufacturers in co-operation with their distributers," Reeves declared.

Lower Insurance Urged

Among other questions which should be given careful consideration, according to Reeves, are lower insurance rates; better, although not necessarily cheaper service; fewer taxes; a decrease in accidents and a campaign which has been started by some interests to have motorists pay for the building of good roads, although the highways benefit the public as a whole. Reverting to the used car problem, he said:

"During the stress of the competition of the past six months, the ridiculous allowances for second-hand cars were a form of price cutting. However, it was the same when there was an over-demand for cars. Even in those days, dealers allowed more than cars were worth, so that car selling became largely a matter of trading with the owner of an old car.

"The used car situation may not be better until human nature is better. Everyone has his own right to judge car values and it will take a lot of educating to prove to dealers the real value of used motor cars and trucks.

Allowances Too High

"The used car problem should be studied by the best brains of manufacturers and their dealers. Unfair allowances and inefficient selling plans, with the resultant money loss, are a blot on the escutcheon of one of America's greatest industries.

"Some car manufacturers have not been blameless in this for under the stress of recent conditions they have sometimes pressed the dealer to take new cars in greater quantities than he has been able to handle. They have also overtraded through their branches.

"I look to see the car and truck manufacturers, by advertising and sales promotion work, help to move their own makes that their dealers have on hand, and thus broaden the market for new cars. Sales managers must appreciate the need to help dealers in the greatest of all obstructions to increased new car sales."

REDUCTION FOR TULSA

TULSA, OKLA., Sept. 26—The Witt-Thompson Motor Co. has reduced prices on the Tulsa roadster and five-passenger touring car, Model E 1-3, from $1,285 to $1,175.

Calendar

SHOWS

Sept. 28 - Oct. 8 — New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association. Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January — Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madi- Automobile Show, Grand Central Palace. Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Jan. 30-Feb. 4—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11 — Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg. Agricultural Sample Exhibition.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Oct. 10-22—Olympia, England, Truck Show. Nov. 4-12—Car Show. Nov. 28-Dec. 3—Motorcycle Show.

Nov. 4-12 — London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

Nov. 26 - Dec. 3 — Shanghai, China, Automobile Show.

March, 1922 — Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Associcao Automobilista Brazileria.

CONVENTIONS

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Nov. 15-17—Kansas City, Second Annual Meeting of American Petrolum Institute.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

S. A. E. MEETINGS

Detroit, Sept. 23, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.

Dayton, Oct. 1—First Fall Meeting.

New York, Jan. 10-13, 1922—Annual Meeting.

Underwriters Plan to Reduce Policies

Propose to Cut Automobile Risks in Two—Recognition Given Moral Hazard

NEW YORK, Sept. 28—A general reduction in the size of automobile insurance policies, in most cases amounting to 50 per cent, was announced at the annual conference of the National Automobile Underwriters, held at the Commodore Hotel here. It was explained that while policies issued last year would be continued, underwriters throughout the country were more cautious in renewing or issuing policies.

Several speakers spoke of policies issued a year ago as a "potential moral hazard," declaring that an unscrupulous automobile owner can risk the loss of his car under last year's policy knowing that he can recover more than the present sale price for it on his policy.

It was the consensus among those present that last year was unusual in the automobile insurance business because of the violent changes which took place and the resulting experiences of the companies, but the belief was expressed that the worst had been passed and that with new restrictions imposed on automobile owners by legislation in many states there would be a continued improvement.

Some of those who addressed the gathering declared that the business could be stabilized through compelling policy holders to take greater interest in their cars, and a lengthy discussion ensued on a means to bring this about.

It was pointed out that owners were negligent in the care of appurtenances on their cars, and that not infrequently when filing claims for losses of the kind, asserted the part was recently purchased when it had been in use for some time and had deteriorated greatly in value.

W. B. Burpee secretary of the New Hampshire Insurance Co. of Manchester, N. H., was elected president of the conference to succeed George Bulkley of the Springfield Fire and Marine Insurance Co. of Springfield, Mass. John Marshall, Jr., of the Firemen's Fund Insurance Co. of San Francisco was elected vice-president, and F. W. Day was elected treasurer.

DELAYS SETTLEMENT

PHILADELPHIA, Sept. 26—Insurance companies here writing automobile collision and fire policies are disturbed over the large losses that are being claimed this year and are taking steps to remedy the condition.

One of the largest automobile insurance underwriters in this district has discontinued altogether writing policies on four of the low priced machines. Another company has adopted the practice of delaying settlement until a thorough investigation of each loss has been made, in many cases this extending up to the full sixty-day limit.

Insurance brokers are making a more thorough investigation of the "moral hazard" involved in each case. A casualty company specializing in liability and property damage coverage reports the demand for this kind of insurance has been in excess of last year.

HOLD BATCHELDER FUNERAL

NEW YORK, Sept. 27—The late Amos G. Batchelder, former executive chairman of the American Automobile Association, who was killed in an airplane accident on May 28, last, will be buried to-morrow at his old home at Attica, N. Y. The body will be taken from the receiving vault at Forest Lawn Cemetery, Buffalo, at one o'clock and carried over the new Batchelder Highway to Attica, where funeral services will be held in the Masonic Temple.

Ford Is Reducing Accumulated Stocks

New Manufacturing Schedule Adopted to Reduce Inventory Before Winter

DETROIT, Sept. 27—In the face of steadily increasing business since the price cut of Sept. 2, Ford Motor Co. has adopted a manufacturing schedule which will work off all surplus parts accumulated in the many assembly plants of the company before the winter months set in.

For the second successive Saturday, the Highland Park plant, in which all the parts are manufactured, was down. The company production officers deny that a five-day weekly working schedule has been determined upon, but only that this half day closing is to bring about an equalization of stock.

In addition to the half-day closing, however, employees in many departments are now working on alternate week shifts and have been notified that this arrangement would be continued for the present.

From the company's statement that working arrangements of this kind have been made for equalization of stocks, it is evident that considerable surplus has been accumulated in the rush of summer manufacturing, and that the company does not intend to carry this inventory over the winter. There is every indication, however, that operations will be continued on an ample scale for the balance of the year.

MERIT MAKES REDUCTIONS

CLEVELAND, Sept. 26—The Merit Motor Co. has reduced the prices of its two passenger and four passenger models from $2,245 to $1,985.